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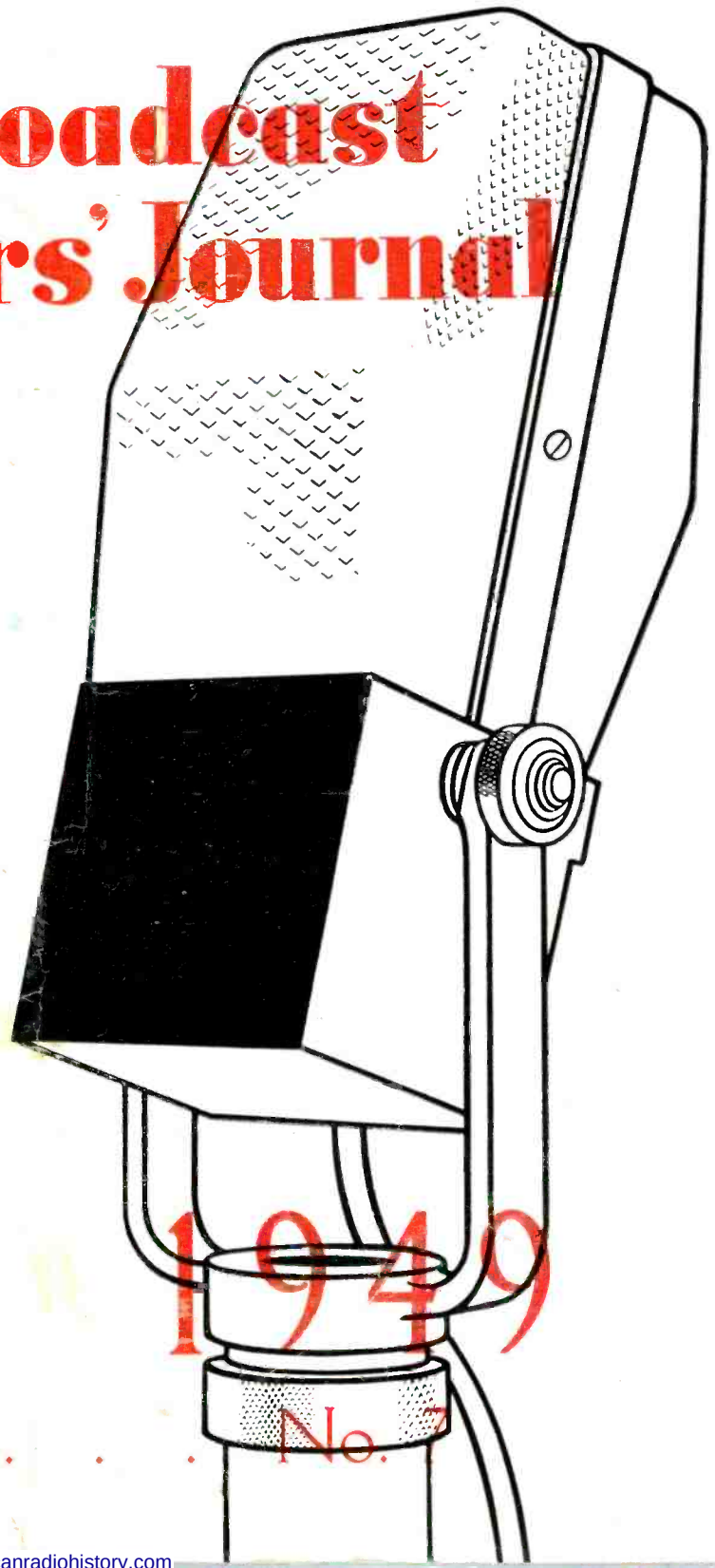
The Broadcast Engineers' Journal



Featuring---

a compendium
of Broadcast
Microphone
data

July 1949

Vol. 16 . . . . No. 7

C. WESTOVER
Executive Secretary

The NABET PRESIDENT'S MESSAGE AND PERTINENT TOPICS from the NATIONAL OFFICE

J. R. McDONNELL,
President, NABET

Recently this office was presented with a proposition from a network that it proposed to "layoff" vacation relief employees to effectuate economics. Additionally it was proposed to reclassify some "regular" employees to vacation relief status.

This proposition was made to some Chapters and this office simultaneously. After protests were made this method of operation was dropped. This would have amounted to summarily dismissing men, without severance pay, and instantaneously hiring on a temporary basis, this depriving men of their contractural rights. No such practice can be allowed. It is imperative that all Chapters keep their eyes open for this sort of thing.

This office has from time to time been presented with inquiries as ot the advisability of including projectionists in NLRB petitions for certification of newly organized stations. It should be abundantly clear that such projectionists work within the engineering departments and very properly belong within NABET's jurisdiction as does the work of kinescope photography.

NABET ELECTIONS REPORTED

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Hollywood	Ben Doty
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Unreported to Deadline

Cleveland, Dixie, Philadelphia, Pittsburgh

The Annual Meeting of NABET National Council will be held the week of October 10th through October 14th, inclusive.

In accordance with the invitation accepted by the three New York Chapters, last year in Detroit, the meeting will be held in New York City.

This year, perhaps more than in any past year, your chapter chairman will need instructions from his membership.

Local chapters should have several general meetings, prior to October 10th, for the purpose of determining what matters should be placed before the National Council. Study your NABET Constitution, get acquainted with NABET problems, and be prepared to advise your chairmen, intelligently, how to act in your behalf.

As this is being written there is still no action in Congress in respect to Labor Laws. Have you written your Congressman? It is imperative that every union member advise his representatives in Washington, D. C., of the necessity for modifying the present Labor Laws. The continuance of the Taft-Hartley Act is making it increasingly difficult for your union, and all other unions, to continue their normal endeavors in your behalf.

As this reaches you early in July, the chapter elections should have been completed. My best wishes and congratulations to the new chairmen. Yours is one of the most important functions in the NABET. How well we succeed will depend, to a great extent, upon the efficiency and enthusiasm with which you chapter chairmen carry out the wishes of your constituents. Next year is a critical one and the entire NABET membership will be looking to you for leadership and guidance.

JOHN R. McDONNELL,
President.

NABET

is the *only* union of broadcast engineers whose sole concern is the welfare of the broadcast engineer.

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ED. STOLZENBERGER, EDITOR AND BUSINESS MGR.

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NATIONAL N.A.B.E.T. OFFICE
Room 1002, 421 Seventh Ave., New York 1, N. Y.
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NABET means **good** trade-union practice.

NABET is the **progressive** union in the Broadcast Field.

Contact any of the following officers for further information:

J. R. McDonnell, Pres.
375 O'Farrell St., Room 101
San Francisco 2, Calif.
Ordway 3-8484

C. Westover, Exec. Sec'y.

H. E. Hiller, Nat'l Sec-Treas.
C. L. Gorsuch, Nat'l Rep.
421 7th Ave., Room 1002
New York 1, N. Y.
Wisconsin 7-0327

Geo. Maher, National Rep.
80E. Jackson Blvd. Rm. 543
Chicago 4, Ill.
Wabash 2462

Chapter Chairmen

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75 Kenwood Road
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Ed Stolzenberger
116-03, 91 Avenue
Richmond Hill 18, N. Y.

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D. Roy Glanton
5500 Kansas Ave. Rt. 2
Omaha 12, Nebraska

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4718 Chestnut
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10 Leroy Place
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Route 1, Box 260
Palm City, Calif.

Concise Data and Theory on Broadcast Microphones

Revised to June 1949

The original Microphone Data and Theory article was published Dec. 1941, and covered only RCA microphones. A revision was published March 1947 which was expanded to include Western Electric microphones. Demand has long since exhausted our reprints. The tabular data has been further expanded and now includes data on RCA, Shure Brothers, Amperite, Electro-Voice, and Western Electric. Comments leading to furthering the usefulness of this material are in order.—Ed. S.

RCA 77-D

RCA 88-A

RCA 44-BX

THIS article is intended to offer our readers a reference source of information about several of the most popular present-day, high quality broadcast microphones. We intend to add to this information in future articles with data about microphones of other manufacturers including those in the lower price ranges. The important characteristics* of the microphones shown are given in table form followed by a review of the major differences in construction and theory of operation of the pressure, ribbon velocity and uni-directional type microphones.

Pressure Microphone

To start our review of microphone construction and theory of operation we will consider the pressure microphone. This type of microphone has only one of the two surfaces of its diaphragm exposed to the atmosphere. The diaphragm is forced inward from its normal position as compressed portions of a sound wave reach it and is displaced outward as rarefied portions of the wave arrive.

A very important characteristic of the microphone is its failure to discriminate between sound arriving from random directions (at the lower frequencies). Even sound waves originating at the rear of the microphone "bend" around the microphone case and actuate the diaphragm as though they had originated at front. This is true up to the frequency where the depth of the microphone case approaches the wavelength of the sound. Thereafter, due to diffraction, the response decreases with frequency for sounds arriving from the rear of the microphone. In order to obtain the best response it is necessary to limit operations to a rather small angle in front of the microphone. Also it is obvious from above that the smaller the microphone the higher the frequency at which diffraction becomes important and hence the wider the range of uniform response.

A marked difference between pressure microphones is the way in which their mechanical moving systems translate the information in the sound wave to electrical impulses. With the condenser microphone (where diaphragm displacement determines the value of capacity and hence the output) it is necessary that the amplitude of the diaphragm displacement by constant for constant pressure, regardless of frequency. In order to achieve this reaction of the moving system to the sound wave, it is necessary for stiffness (capacitive reactance) to be the controlling element in the mechanical construction of the moving system.

One method of obtaining stiffness as the controlling factor is by use of a stretched diaphragm. This causes the mechanical impedance below the resonant frequency of the diaphragm

Model	Type	Frequency Response	Output Impedance	Output Level**	Directional Characteristics
RCA 44BX	Ribbon Velocity	30—15,000 ±6 db	50/250	—55 vu	Bi-directional
RCA 77D	Combination Ribbon Velocity & Pressure	30—15,000 ±5 db	50/250/600	—54.3 vu —57.3 vu —60.3 vu	Bi-directional Uni-directional Non-directional
RCA 88A	Pressure (moving coil)	60—10,000 ±5 db	50/250	—55 vu	Non-directional
RCA KB2C	Ribbon	50/15,000 ±5 db	30/150/250	—56 vu	Bi-directinal
Shure 55	Dynamic	40/10,000	Multi	—56.8 vu	Cardioid
Shure 556	Dynamic	40/15,000	Multi	—56.8 vu	Super-Card.
Shure 737A	Crystal	60/10,000	High	—54 vu	Super-Card.
Shure 708A	Crystal	60/7,500	High	—53 vu	Semi-directional
Shure 76B	Lapel Crystal	30/6,000	High	—57 vu	Semi-directional
Shure 51	Dynamic	60/10,000	Multi	—52.5 vu	Semi-directional
Amperite R80L	Ribbon	40/14,000	200	—56 vu	Bi-directional
Amperite R80H	Ribbon	40/14,000	High	—56 vu	Bi-directional
Electro-Voice 645	Dynamic	40/15,000	50/250	—50 vu	Omni-directional
Electro-Voice 650	Dynamic	40/15,000	50/250	—46 vu	Omni-directional
W. E. 633A	Pressure (moving coil)	50—9,000 ±3 db	20	—59 vu	Non-directional
W. E. 639A	Combination Ribbon Velocity & Pressure	40—10,000 ±4 db	35	—55 vu —61 vu —61 vu	Uni-directional Bi-directional Non-directional
W. E. 640AA	Condenser (with assoc. amplifier)	50—15,000 ±6 db	(Amp. Out.) 30—50/200—250	(Amp. Out) —45 vu	Uni-directional Bi-directional Non-directional

to be almost entirely stiffness reactance and the diaphragm displacement will be constant for constant pressure over this range.

The more the diaphragm is stretched the higher will be the resonant frequency (below which the microphone response is uniform) but the less the sensitivity.

The Western Electric 640-AA is a condenser type microphone recommended for high fidelity pickup. The microphone and its associated (RA-1095) amplifier are contained in a projectile like case. The microphone itself is an inch long and an inch in diameter and fits into the tip of the case. Its small size is a pronounced advantage from a fidelity standpoint in that physically, it approaches the ideal of a "point pick up" device, eliminating possible phase distortion, due t sound waves striking simultaneously against different por tions of the microphone diaphragm. Moreover, the smaller the pick-up device, the less the disturbance caused in the sound field by the mere presence of the pick-up element.

Fig. 1 shows the frequency response of the 640AA microphone and RA-1095 amplifier.

Now in contrast to the stiffness controlled condenser microphone (and the mass controlled ribbon velocity microphone to be discussed) there is the moving coil type of pressure microphone which has resistance as the controlling element in order that its output should be constant for unit pressure. This is due to the fact that the emf induced in the coil is directly proportional to the velocity of the coil. Therefore the coil velocity should be proportional to pressure and independent of frequency.

The models 88-A and 633-A are good examples of the moving coil type of microphone. The directional response of the 88-A is shown in Fig. 2.

Another type of pressure microphone whose uniform output depends on resistance, is the pressure actuated ribbon microphone. This is the microphone that is combined with the ribbon velocity to form the Uni-directional microphone which we shall discuss later.

It consists of a ribbon suspended in a magnetic field and

*All specifications are those of the manufacturers.
**Input level of 10 bars (10 dynes/cm²).

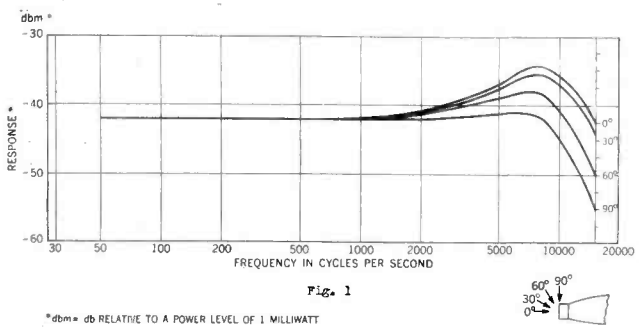


Fig. 1

Frequency response of W.E. 640-AA and RA-1095 amplifier

freely accessible to the atmosphere at one surface, but terminated in an accoustic impedance at the other surface. Here, again, the induced emf is proportional to the velocity of the ribbon through the magnetic field. Therefore, in order to have velocity proportional to pressure and independent of frequency, the controlling factor is resistance. This is obtained by terminating one surface of the ribbon into an accoustically treated pipe which appears as an accoustic resistance to the ribbon and is very large compared to the reactive components.

Velocity Microphone

The ribbon velocity microphone also consists of a light corrugated metallic ribbon suspended in a magnetic field but is freely accessible to air vibrations from both sides.

In contrast to the pressure microphone, the ribbon in the velocity microphone is not actuated by the sound wave varying the pressure on one of its surfaces. Rather, the ribbon is actuated by the pressure gradient or difference in pressure on its two surfaces. The ribbon being relatively limp, has negligible stiffness reactance and, being suspended in free space, has negligible accoustical or mechanical resistance. Therefore, though the ribbon mass is small, it is the controlling element. The ratio of the velocity of the mechanical system to the pressure or velocity in the incident plane sound wave is substantially independent of frequency.

One of the most important details of construction concerns the size of the baffle surrounding the ribbon. The term baffle is used here to designate a structure (magnetic pole pieces) that determines the air path between the front and back of the ribbon. Although the baffle is of rectangular shape, we will consider, in this discussion, only the shortest air path around it from one surface of the ribbon to the other.

We will consider the effect on the ribbon of just one cycle, of a sound of low audio frequency. In Fig. 3, let

x = Pt. of maximum compression
y = Pt. of maximum rarefaction
x = Pt. of normal pressure

Let us assume that the solid wave in the figure represents the cycle which is actuating the ribbon at a specific instant. Let lines A and B correspond to the two surfaces of the ribbon and the distance between them represent the shortest air distance around the baffle from one surface of the ribbon to the other. We will assume it is two inches for a certain microphone. It is obvious that at A, which is (at the instant under consideration) the far side of the ribbon from the direction of the sound source, the pressure is approximately one unit above normal, whereas, at B which is two inches away from A or the surface of the ribbon facing the sound source, the pressure is four units above normal. Naturally the ribbon is actuated in the direction of the least pressure. It is clear that as the wave continues past the ribbon, the pressure between A and B will continually vary and the ribbon will always be actuated by the difference in pressure on its two surfaces.

The voltage generated by the ribbon moving through the magnetic field is given by:

$$e = Blx$$

where e is the generated emf
B is the flux density of the magnetic field
l is the length of the ribbon
x is the velocity

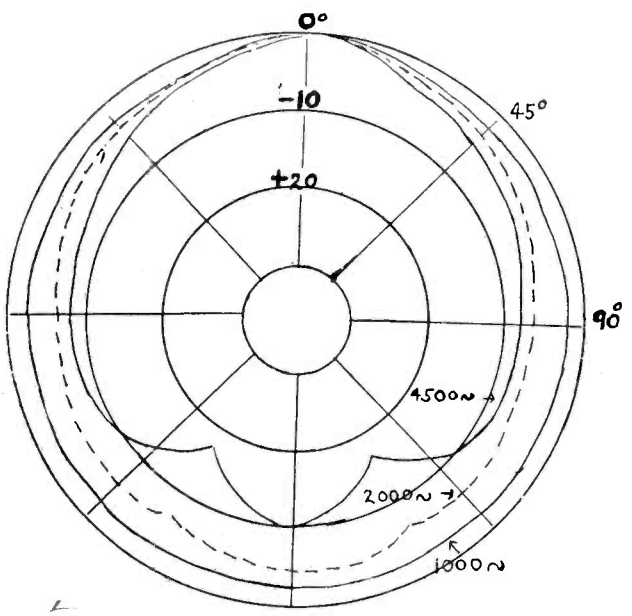


Fig. 2—Directional response of 88-A

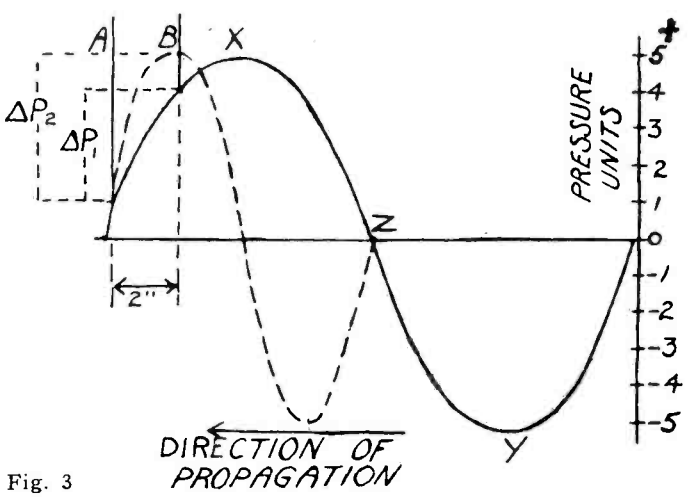


Fig. 3

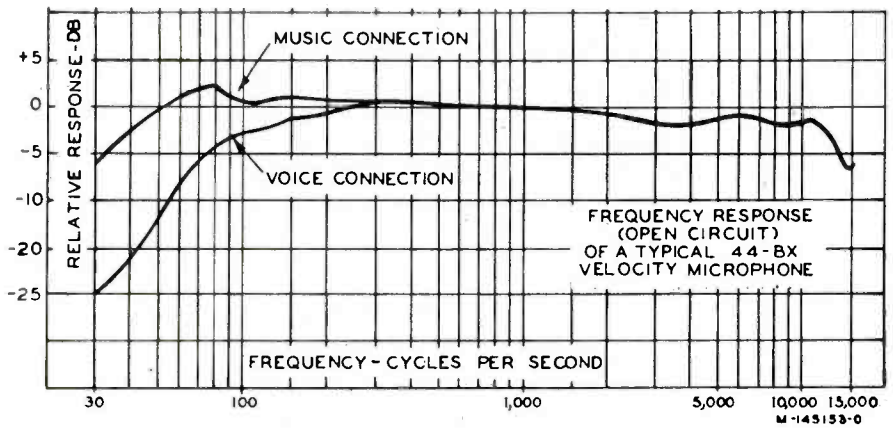


Fig. 4

We have already mentioned that the moving system in the microphone is mass controlled. Mass can be considered as an inductive reactance. Therefore, the higher the frequency actuating the ribbon the greater the reactance offered by the ribbon. This would cause the ribbon velocity to vary inversely with frequency if it were not for the fact that the pressure gradient or difference in pressure on the ribbon surfaces increases with frequency. The increase of pressure gradient with frequency can be seen in Fig. 3 where the difference in pressure units between lines A and B is greater for th higher frequency wave. This is true up to the frequency at which the thickness of the baffle is equal to one-quarter wavelength of the actuating sound wave.

At the lower frequencies the larger the baffle (the greater the air distance between ribbon surfaces) the greater the pressure gradient and the higher the output. However, with the larger baffle, the output will fall off more rapidly as frequency is increased due to the size of the baffle approaching the length of the sound wave, at which time the pressure difference between the front and back of the ribbon is a minimum.

When a ribbon velocity microphone is actuated by spherical waves (close to sound source as when making a voice pickup) the bass response is greatly accentuated. To compensate for this, the RCA model 44 BX has provision for altering the low frequency response characteristic when the microphone is to be used for voice pickup. Actually, the adjustment places a reactor in parallel with the transformer winding (for 50 ohm output impedance) or part of winding (for the 250 ohm output impedance). The two curves in Fig. 4 show the frequency response of the 44-BX for music pickup and with the reactor in the circuit for voice pickup.

When the "Voice" reactor is used it drops the response from about 300 cycles down. Note that the "Voice" curve was measured in a plane wave field. Therefore, when the microphone is actuated by spherical waves, the response curve will be substantially flat.

A small circular hole is provided in the cover plate of the transformer case through which may be seen the letter M (music) or V (voice) indicating whether the microphone is set for music or voice operation.

We might also note that when a sound wave originates at the side of the velocity microphone (in same plane as the ribbon) the distance around the baffle to front and back of the ribbon is the same. Therefore, the pressure on front and back is about equal and approximate calcellation results. This accounts for the very important bi-directional pickup characteristics of the velocity microphone.

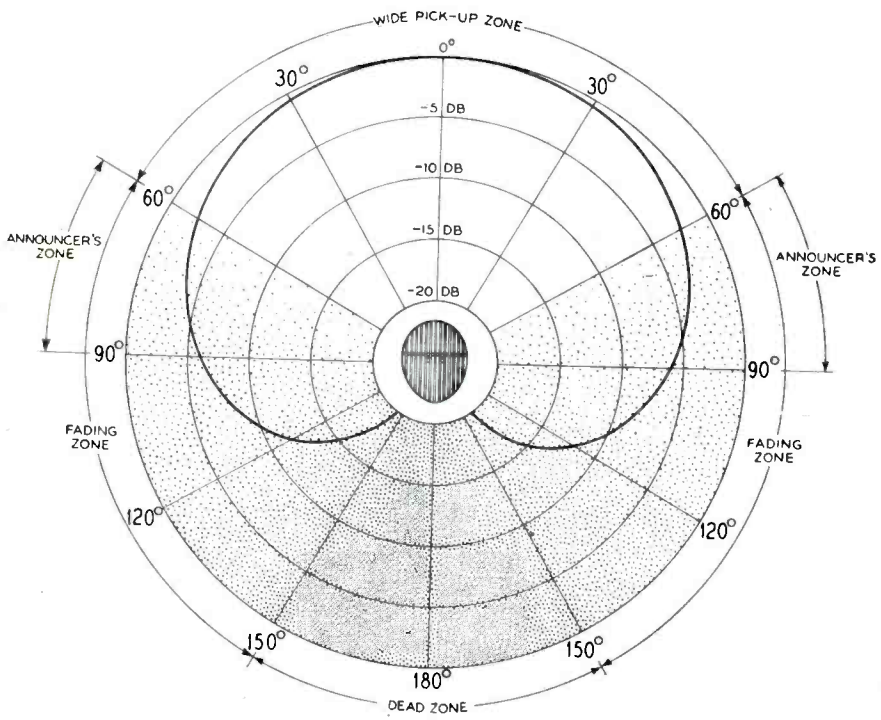


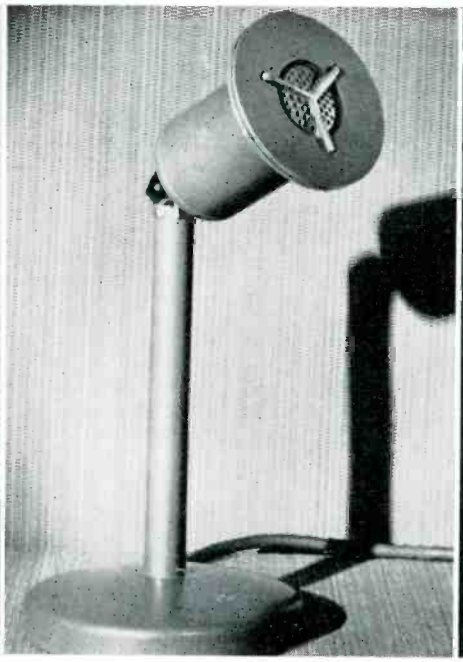
Fig. 5—Reference Chart for interpreting the performance of the 639-A Cardioid Directional Microphone

Uni-directional Microphone

Speaking of important directional characteristics leads inevitably to a discussion of the Uni-directional microphones which have become so popular in recent years. The measured directional response curves of these microphones approach cardioid patterns.

"Cardioid" is the term used by mathematicians to express the plot of $1 + \cos\theta$, because of its heart-like shape. Technically, a curve (see Fig. 5) in polar coordinates that represents the sensitivity of the microphone versus the angle of sound approach is similar to the plot of $1 + \cos\theta$, that is a "cardioid."

W.E. 639-A



W.E. 633-A

W.E. 640-AA

An approximate cardioid directional response can be obtained by combining the outputs of a non-directional pressure unit with a bi-directional ribbon velocity unit. As has been shown, the output of the pressure unit is independent of direction and may be represented by a pure number, say unity. The ribbon velocity has an output which reverses in phase when the sound direction is reversed, and is actually proportional to the cosine of the angle. Adding the two together, the result is $1 + \cos\theta$, the "cardioid."

The Western Electric 639-A is an example of a high quality uni-directional microphone. The 639-A uses the well known "Eight Ball" dynamic microphone for the pressure unit and mounted above the dynamic unit is a ribbon velocity section with a specially designed ribbon. Sounds originating at the rear of the microphone actuate the two sections so that the outputs are out of phase and approximate cancellation takes place. Over the range of 40 to 10,000 cycles the average discrimination between sounds originating at the front and rear of the microphone is 20 db. Fig. 5 shows that the pickup angle from 60 to 90 degrees is known as the announcer's zone because at this angle the ribbon element contributes very little to the total output and the announcer may talk close to the microphone without employing a "voice strap." A switch on the back of the microphone allows for using either the non-directional pressure or the bi-directional velocity alone when desired.

Polydirectional Microphone

The new RCA 77-D Polydirectional microphone incorporates an ingenious design whereby a single ribbon unit combines the action of the heretofore necessary separate pressure and ribbon velocity units.

The rear side of the ribbon is terminated in an acoustic

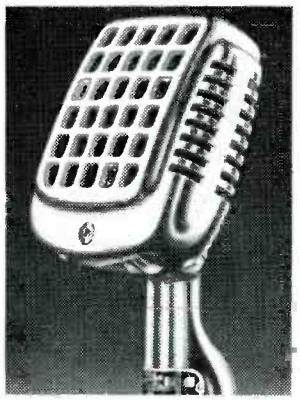
Electro-Voice
Model 645

Electro-Voice
Model 650

Shure Brothers
Model 55

Amperite Co.
Model R80 (L or H)

Shure—556



Shure—737A

impedance which looks like an infinitely long tube but which is actually a connector tube running from the rear of the ribbon to an acoustic labyrinth located in the lower microphone shell. An opening in the back of the connector tube is made variable in size by a rotating plate control. The directional characteristics of the microphone are controlled by varying the size of this opening.

When the aperture is wide open the ribbon is not terminated in the acoustic labyrinth but rather has both surfaces exposed to the medium. Under these conditions the microphone operates as a straight ribbon-velocity unit and the pickup is bi-directional. When the opening is about half closed, one-half of the ribbon has both surfaces exposed to the medium and therefore operates as a ribbon velocity unit but the other half of the ribbon is terminated in the acoustic labyrinth and operates as a pressure unit. Hence the output of the two sections tend to reinforce each other for sounds arriving from the front but tend to cancel each other for sounds arriving from the rear giving the typical uni-directional cardioid pattern. When the aperture is completely closed the entire ribbon is terminated in the acoustic labyrinth and the microphone operates as a straight pressure unit with a non-directional pickup. Because the aperture is continuously variable a great number of different directional pickup patterns may be obtained.

When the control is in the uni-directional position sounds arriving from the rear of the microphone are attenuated an average of 14 to 20 db relative to sounds from the front. This gives approximately a 10 to 1 ratio of desired to undesired pickup.

In addition to housing the acoustical labyrinth the lower half of the case contains the output transformer and a selector switch for voice or music. The switch will attenuate the low frequencies (as in the model 44-BX) below 300 cycles for voice pickup and has three positions designated as "M," "V_1," and "V_2." The switch, operated by a screwdriver, is accessible

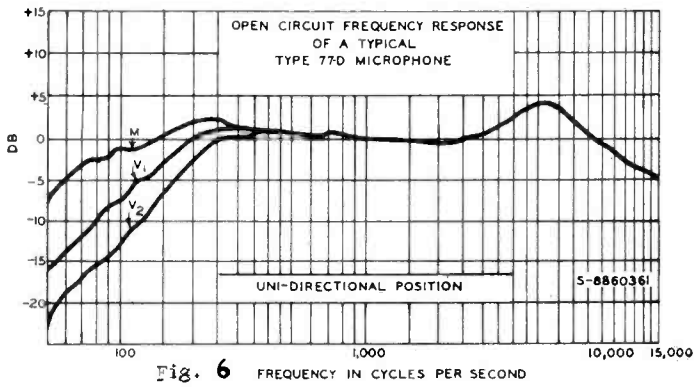


Fig. 6

from the bottom of the lower cylindrical shell. The frequency response characteristics for the 77-D are shown in Fig. 6 for the uni-directional setting of the directional pattern control and with the "Music-Voice" switch in each of its three positions.

Amperite—(see photo opposite)

The Studio Ribbon Microphone by Amperite has been designed to meet the most exacting reproduction requirements of Broadcasting Stations, Recording Studios, and Public Address. The frequency range covered is 40 to 14,000 cps; out put—56db; harmonic distortion less than 1%; discrimination with angle—60 to 10,000 cycles, less than 1/10th that of a diaphragm microphone. Unit is shock-mounted in rubber. The case is unusually rugged and will withstand a great deal of mechanical abuse. Not affected in any way by altitude, moisture, or temperature. Available in 200 ohms output, 50 ohms on special order. Also available in hi-impedance. When used for public address, the feed back is unusually low due to the fact that the frequency response of the microphone is free from peaks.

Model R80L—200 ohms
R80H—hi-impedance.

Lightweight Microphone

The Type KB-2C Velocity Microphone is a ribbon-type microphone designed for general studio and remote applications. It has a frequency range suitable for reproduction of both speech and music, and a directional response that per-

Sure—708A

Shure—76B

mits attenuation of background noise and reflected sounds. Although the microphone is small and light, its output level is equal to that of larger microphones.

The moving element is a corrugated aluminum ribbon suspended between the poles of a permanent magnet. The ends of the ribbon are connected to a transformer that provides an output impedance of 30, 150, or 250 ohms.

To permit compensation for the effect of distance between the sound source and the microphone on frequency response, a two-position screwdriver-operated switch is provided on the side of the microphone head. The response is essentially uniform between 80 and 8,000 cycles per second when the sound source is more than three feet from the microphone and the switch is in the M (music) position, or when the source is between one and three feet from the microphone and the switch is in the V (voice) position. When the switch is in the V position, the frequencies below 500 cycles per second are attenuated, so that the low-frequency accentuation caused by proximity of the source to the microphone is cancelled. Frequency response curves for distances between the source and the microphone greater than three feet are shown.

The microphone has a bi-directional characteristic about the horizontal and vertical axes, which is almost independent of frequency. The output is maximum for sounds originating directly in front of or back of the microphone, and minimum for sounds originating at the sides. To permit placing the microphone head at the angle of maximum response, the head can be tilted 30 degrees forward or backward.

A 30-foot, 3-conductor, shielded cable with a female plug is supplied with the microphone. The plug mates with a plug-insert in the microphone shank. A hinged cover on the shank provides access to the plug insert.

The position of the microphone has an important effect on program quality. Since the best position depends on many factors, such as the number of performers, types of musical instruments, and construction of the studio, it should be found by experimental placement, and by monitoring the program with high-fidelity head-sets or a high-fidelity loudspeaker.

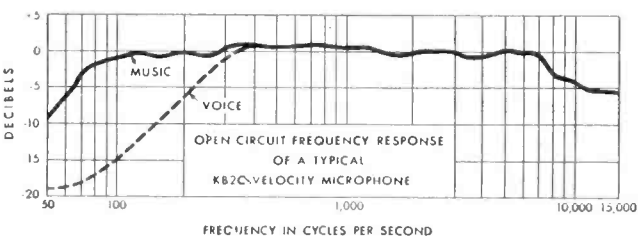
When placing the microphone, observe the following general rules:

a. Place the microphone so that its front or rear surfaces faces the source of desired sounds, and its sides face the sources of reflections or other undesired sounds.

b. Protect the microphone from strong winds and explosive-type sounds or the ribbon may be damaged.

For speech pickup when the speaker is between one and three feet from the microphone, turn the V-M switch to the V position. For speech pick-up, when the speaker is three feet or more from the microphone, or for music pick-up, turn the V-M switch to the M position. Performers should not be closer to the microphone than one foot even when the switch is in the V position (unless special effects are desired) or voices will sound unnaturally deep.

The new miniature RCA velocity microphone takes its place alongside its world famous big brother, the 44-BX. The midget microphone (RCA Type KB-2C) has a sensitivity and output level comparable to those of the larger model, but weighs only 12 ounces and fits comfortably in the palm of the hand.



Effective Output Level at 1000 *Cycles*—56 dbm. Sound pressure equals 10 dynes per square centimeter.

Voltage Output.

a. 30-ohm tap: 460 x 10^{-6} volts.
b. 150-ohm tap: 1.08 x 10^{-3} volts.
c. 250-ohm tap: 1.54 x 10^{-3} volts.

Output for Speech at Two Feet—63 vu (250-ohm tap).

Output Impedance—250 ohms, may be changed to 30 or 150 ohms.

Frequency Range—80 to 8,000 cycles. (See fig. 2).

Recommended Load Impedance—Unloaded input transformer.

Dimensions and Weight—Height, 8⅞ inches; width, 1⅛ inches; depth 1 inch; weight 13 ounces (less cable).

Stand Fitting—⅝-27 fixture thread.

Cable Supplied—30-foot, 3-conductor shielded, with plug.
Finish—Satin chrome and umber gray.

Official I.R.E. Summaries of Technical Papers

Presented at the 1949 IRE Convention—continued from last month

35. The Evaluation of Specifications for Cathode-Ray Oscillographs.

P. S. Christaldi, *Allen B. Du Mont Laboratories, Inc., Clifton, N. J.*

The selection from published specifications on cathode-ray oscillographs of the equipment best suited for particular requirements is often hampered by inadequate or non-existent information. The types of specifications usually published are reviewed and analyzed for adequacy. Some of the characteristics on which inadequate or no information is given are reviewed, and proposals are made for additional ratings.

Since the performance of a cathode-ray oscillograph depends on the co-ordination of many characteristics, undue emphasis on a particular rating may be misleading. The interrelation of the ratings on characteristics such as amplifier bandwith, time-base range, maximum visual and photographic writing rates, etc., is considered in terms of self-consistency of a design.

36. Photographic Techniques in Cathode-Ray Oscillography.

C. Berkley and H. Mansberg, *Allen B. Du Mont Laboratories, Inc., Clifton, N. J.*

The oscillographer may be adequately equipped to deal with the electronic phases of cathode-ray-tube recording but relatively unfamiliar with the basic photographic techniques. Certain problems peculiar to crt photography recur in many applications. Use of the techniques described for obviating them will result in considerable saving in development time and improvement in the quality of the recordings.

The problems discussed include: 1. Relative merits of single-frame versus continuous-motion recordings for recurrent, transient, and drifting phenomena. 2. Suppression of undesired screen illumination from external and internal sources. 3. Those affecting the choice of the oscillograph, the camera, the recording medium, and processing techniques. 4. Calibration and identification of recordings. 5. Image stability. 6. Interpretation of records.

ELECTRONIC COMPUTERS

Chairman, E. W. Cannon
(National Applied Mathematics Laboratory, National Bureau of Standards, Washington, D. C.)

37. A Dynamically Regenerated Memory Tube.

J. P. Eckert, Jr., H. Lukoff, and G. Smoller, *Eckert-Mauchly Computer Corporation, Philadelphia, Pa.*

The necessary development work on a new high-speed memory system suitable for use in electronic digital computers and their associated apparatus has been completed. The work on this system was begun at the Moore School, University of Pennsylvania, and has been continued at the Eckert-Mauchly Computer Corporation until the present time. F. C. Williams of Manchester University has headed a similar project in England, and a certain amount of parallel work has taken place in both countries on the same subject. Both projects had as their final goal the use of a standard or nearly standard cathode-ray tube to provide storage of a large number of binary digits at relatively low cost per digit, and more particularly with access time of not more than a few microseconds. Basically, memory is provided by charged areas which lie on the inner surface of the phosphor of a standard cathode-ray tube. These areas are placed on the surface by the electron beam and a system is provided for using two differently shaped areas, one representing a 0 in the binary system and the other representing a 1. Replacement of one by the other, using the electron beam, causes a signal to be induced into a plate near the face of the tube. The shape of the induced signal can be used to distinguish between an area representing a 1 and an area representing a 0. Reading the areas at random in this fashion would cause loss of the original pattern. Areas can be made indistinguishable by the action of the beam even on a spot adjacent to those being operated on and also by leakage of the charge due to the fact that the phosphor is not a perfect insulator. These undesirable losses are prevented by a systematic reading and writing which operates faster than these deteriorating effects. The general method is similar to the re-

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D. ROY GLANTON

Chairman

OMAHA - NABET

Well, fellas, the new Chairman of the Omaha Chapter is that ole' work horse, Roy Glanton, or "Tex" as he is called around here.

This is Roy's third term as Chairman of the Omaha Chapter, and right now we'd like to give you a little of Roy's biography.

Roy was born on a farm near Stephenville, Texas, May 2, 1900. He lived for 18 years on farms. He then went into town, did various job and finally became an auto mechanic. He was a fireman—then engineer—at a pipe line pumping

D. ROY GLANTON

station. He also worked as an engineer and fireman at a large ice plant. Took an I.C.S. course in Radio 1919-20 and started in a retail radio parts business. Built lots of single tube regen, receivers, neutrodynes, etc.

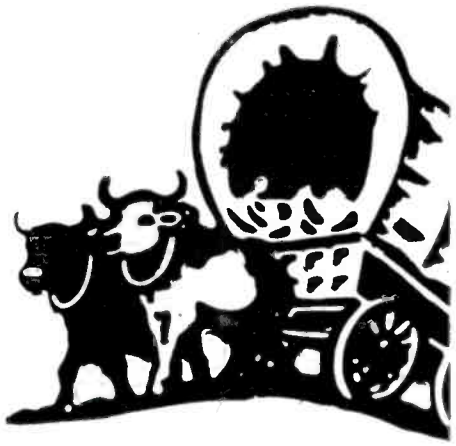
In 1926 he decided to get into commercial radio. So, he went to New York and took a course at the old Radio Institute of America at 326 Broadway. After completing the course, and getting the Telegraph First Ticket, he shipped out of New York on the S. S. Topila (the old Morgan Line). Kept this job for six months, went ashore in Texas and worked at KRLD in Dallas for another six months. He came to Omaha and WOW on May 24, 1929. In May of this year, he started his 21st year. He has been Transmitter Supervisor since 1942.

After he started working for WOW, he went back to Texas and married the girl who had been a good friend for a number of years. They have one child, a boy—Dillard, age 18, who is taking Aeronautical Engineering at Purdue University.

Roy has several hobbies: Ham radio—W∅GTC since 1932; likes all the natural sciences: archaeology, geology, natural history, etc.; does quite a bit of exploring; takes pictures—both 8 mm movies and 35 mm colored slides; takes long vacations and has seen most of the United States; he is also active in church circles.

Roy is now back in as Chairman of the Omaha Chapter, and the rest of the guys as well as "YE ED" wish Roy a successful year as it is a rough job.

"NOBETR — NABET 'R"



OMAHA NEWS

By Louis De Boer

(*All photos by Al Maller Omaha Chapter*)

The Omaha elections are over and D. Roy Glanton was elected to the office of chairman of the Omaha Chapter. Al Maller was appointed Secretary-Treasurer, and Glenn Flynn and Bob Rudd are Studio and Transmitter councilmen, respectively. Your writer was re-appointed Journal "ed." We wish at this time to give thanks to Bob Rudd, past chairman; Bill Dunbar, Secretary-Treasurer, and Dick Peck and Roy Glanton, Studio and Transmitter Councilmen, for the grand job, well done during the past year.

"OPERATION SNOWBOUND"
(Standing, left to right) Mark McGowan, Bob Rudd, (seated) Roy Glanton.

The vacation schedule is out and the boys have that far-away-places look in their eyes. No doubt, they are thinking of the fishing and loafing they are going to do when they get that "free time." Free time! Ah, yes! What a delightful sound, with the house to paint and

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GENERAL VIEW OF ASSEMBLY

JOSEPH HEROLD

Manager

WOW - TV

On May 4, 1949, Joseph Herold, our Technical Supervisor, was promoted to the position of Manager of WOW-TV.

Joe was a former member of the Omaha Chapter till his promotion to Technical Supervisor in January of 1944. His interest in promoting TV prompted his starting of the Television Training program in October of 1945. During this training period, the management and the operators went through a period of experimenting and study.

Many problems were solved during this training period and much precious

JOSEPH HEROLD

time will be saved, as a result, when WOW-TV goes on the air. This training period also allowed the operators in AM to fit into the new art of TV.

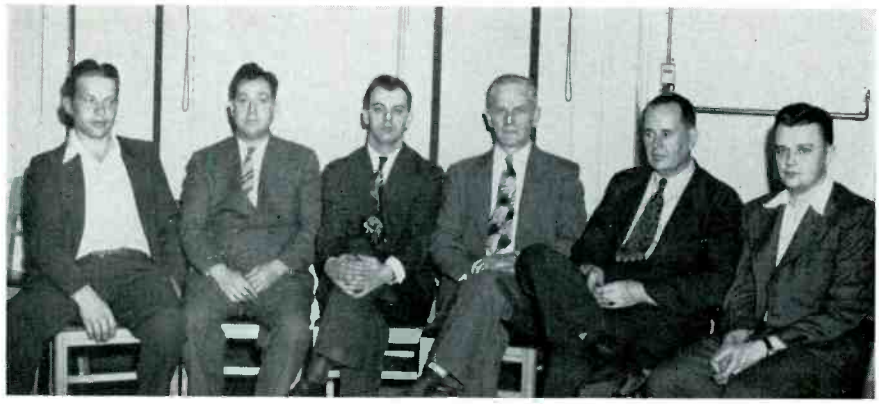
Joe's background is as common as the majority of the fellows engaged in the radio industry. He was born on a farm near Hiawatha, Kansas, on March 8, 1907. His technical training was obtained at the School of Engineering at Milwaukee, Wisconsin. After obtaining his license in 1929, his first job was as a ship operator on the S. S. Puritan and S. E. Alabama. In 1930 he started at WOW as an operator.

He was married in January of 1939 to Miss Lillian M. Dixon of Detroit. His hobby is agriculture. Joe is a member of the following Engineering Societies: Associate, IRE, 1927; Member, American Association for the Advancement of Science.

Joe's close association with the boys at WOW has always kept him, at least to the rest of the fellows, as "one of the boys."

Good luck to you, Joe, you have earned your success.

OMAHA CHAPTER COUNCIL .



OMAHA CHAPTER COUNCIL: John Brunken, Bob Rudd, Al Maller, Roy Glanton, Glenn Flynn, Roy Ekberg, (left to right).

OMAHA NEWS

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the yard work to do. You know, maybe the winter with all the snow and ice isn't so bad after all. Where the boys are going this year, I guess, is a deep dark secret; at least they won't tell where or if, HI.

Now to get to the important biz, the new manager of WOW-TV, Mr. Joseph Herold, invited the membership of the Omaha Chapter of NABET to a steak dinner at the local eating establishment. Mr. Herold's health was toasted and (and also drowned) in wine and other corrupting alcoholic beverages. Success the party was!

Mr. Al Maller, Omaha-NABET photographer, took the pictures that appear with this column. You can see the happy, well-fed looks on the faces of the distinguished gathering. (Looks like an IRE convention, doesn't it?)

A story about Mr. Herold appears in this issue and it is "Ye ED's" hope that you will read it, as Mr. Herold was a former member of NABET and also one of the charter members of the Omaha Chapter. All the best to him as Manager of WOW-TV.

I hope those fellows who attended the NAB engineering convention held in Chicago during the month of April, were able to meet our studio supervisor, Glenn Flynn, and our Technical Supervisor and Manager of WOW-TV, Mr. Joseph Herold.

The ham activities in the Omaha area have slowed down with the coming of summer. The usual net activities are about the only operation being carried on. Three of the Omaha Chapter members, Bob Rudd, Mark McGowan, and Roy Glanton, were honored by Western Union recently for the time they spent in handling important traffic for Western Union during the snow-storms that occurred in Nebraska thruout the winter. The boys actively participated in the famed "Operation Snowbound" of Western Nebraska and received plaques from Western Union for their efforts. Another job well done, boys.

See you next month, fellas! 73.

"NOBETR NABET 'R"

SAN FRANCISCO

By C. T. STEVENS

Flash—Bobby Woods is now a proud father. His wife presented him with a seven pound three ounce girl. This is his first, number one of a series??? The latest changes around here on ABC are as follows, Dick Parks is now a group six super, G. Warren Andresen is now TV-TD, Merwin Jones is TV maintenance super. There have been several new additions to the ABC staff that I have not caught up with yet. President McDonnell was given a dinner on his return from the East. We were not able to at-

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IRE PAPERS

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generation in a mercury digital memory. A great advantage of this system is the ability to move from one part of the memory to any other at high speed. A second advantage is the low cost and easy maintenance allowed by the use of completely standard high-production electronic components with no special tubes. At present, sufficient work and tests have been completed to make possible the detailed analysis of a computer based upon such a memory system. In parallel with this analysis, models of the memory system are being set up to further assess the reliability and practicality of such a computing system.

38. An Electronic Differential Analyzer.

ALAN B. MACNEE, *Massachusetts Institute of Technology, Cambridge, Mass.*

An electronic differential analyzer, capable of solving ordinary differential equations of orders through the sixth, both linear and nonlinear, will be described. This analyzer has a high speed of operation and is extremely flexible with regard to equation parameters and initial conditions. This flexibility permits rapid investigation of wide ranges of equation solutions with regard to periodicity, instability, and discontinuities. Two new computing elements, an electronic function generator and an electronic multiplier, are employed. A number of representative differential equations of the linear and nonlinear types have been solved. Comparison of observed and calculated solutions reveals an accuracy of from 1 to 5 per cent, while the repeatability of the solutions ranges from 0.002 to 0.1 per cent. An analysis of the errors introduced into the differential-equation solutions by the frequency limitations of the computing elements has been made, and the results of this analysis have been verified experimentally.

39. An Analogue Computer for the Solution of Linear Simultaneous Equations.

ROBERT M. WALKER, *Watson Scientific Computing Laboratory, New York, N.Y.*

Linear simultaneous equations occur frequently in science and in engineering. Their solution by numerical methods is straightforward, but the amount of work required increases rapidly with the number of unknowns. A device is described for the solution of systems of linear simultaneous equations with not more than twelve unknowns. It is an electrical analogue computer which accepts the problem information in digital form from a set of punched cards. This facilitates the preparation, checking, and insertion of the input data, and greatly reduces some of the usual liabilities of an analogue device. No special preparation of the problem is required, other than a simple one of scaling the coefficients. Solutions of well-determined problems are easily and rapidly attained and may be refined to any desired accuracy by a simple iteration procedure.

40. The Electronic Isograph for a Rapid Analogue Solution of Algebraic Equations.

BYRON O. MARSHALL, JR., *Cambridge Field Station, Air Materiel Command, Cambridge, Mass.*

An electronic analogue computer is described with which the whole complex plane may be investigated for roots of up to 10th-degree polynomials in a matter of minutes. The roots are given to three places, and the character of the roots is determined. In addition, the value of the polynominal is given for all values of the complex variable. Although the input is limited to real coefficients, practically any polynomial of any degree may be solved by this method. The isograph may be used alone if engineering accuracy is desired, or as an adjunct to a large-scale computing machine. It is believed that the isograph will prove extremely valuable in servomechanisms and other fields where the problem may be represented as a polynomial, and that, in general, theoretical analyses of engineering problems will be furthered by its use.

41. Parametric Electronic Computer.

CHARLES J. HIRSCH, *Hazeltine Electronics Corporation, Little Neck, L. I., N. Y.*

A novel form of computer is described that operates on the principle of an alignment chart wherein data voltages are aligned in time in the same manner that data quantities are aligned in distance on a slide rule. Since the "time scales" of this electronic slide rule may be calibrated according to any function of time which can be electrically realized, a large variety of operations can be performed. If x and y are known functions of time and n is a known constant, the computer can perform the following operation: x^n; xy; x/y; $x+y$; $\sin x$; $\sin nx$; $\sin^{-1}$; $\cos x$; $\cos nx$; $\cos^{-1} x$; $\log x$; $\int x dt$; $\int x dy$; dx/dy. As the operations can be completed in a matter of milliseconds or less, they can be repetitive and performed on variable parameters. Actual circuits which perform the operations listed above are described. Just as slide rules can be made to have any desired accuracy if they are long enough, this computer can be made as accurate as desired if high enough voltages and rapid enough samplings are taken.

SYMPOSIUM: ELECTRONIC COMPUTING MACHINES

Chairman, E. U. CONDON
(*National Bureau of Standards, Washington, D. C.*)

1. **Results of Tests on the Binac.**
   J. W. MAUCHLY, *Eckert-Mauchly Computer Corporation, Philadelphia, Pa.*
2. **The Mark III Computer.**
   H. H. AIKEN, *Harvard University, Cambridge, Mass.*
3. **The IBM Type 604 Electronic Calculator.**
   RALPH PALMER, *International Business Machines Corporation, New York, N.Y.*
4. **Electrostatic Memory for a Binary Computer.**
   F. C. WILLIAMS, *Manchester University, Manchester, England.*
5. **Counting Computers.**
   G. R. STIBITZ, *Consultant, Burlington, Vt.*
6. **Programming a Computer for Playing Chess.**
   CLAUDE E. SHANNON, *Bell Telephone Laboratories, Inc., New York, N. Y.*

Last year's symposium on "Advances Significant to Electronics" included one paper on electronic computers and two others on somewhat related subjects. The enthusiasm with which these papers were received, and the discussion provoked by them and by others on the same subject presented during the regular technical sessions, demonstrated such a widespread interest in high-speed computers that a symposium on recent advances in the art has been scheduled for this convention.

During the past year some computers have been completed and operating tests carried to the point where new evaluations of their capabilities and limitations have become possible. Three of the speakers at this symposium will discuss the construction and operating characteristics of new computers. These results should be of great value in pointing the way toward future development; as an example of the tremendous advances that have already taken place in this fashion, it might be pointed out that the BINAC, which forms the subject of one of the papers, achieves far greater versatility and memory capacity than its logical predecessor, the ENIAC, but at the same time uses less than 5 per cent of the number of tubes.

The BINAC's operating characteristics will be discussed by Dr. Mauchly. This device is of particular interest because, except for input and output equipment, it is entirely electronic, and because it represents the practical application of elements discussed at last year's convention, such as a mercury-delay-line memory and magnetic-tape input and output equipment.

Dr. Aiken of Harvard will discuss the Mark III Computer, latest in the series of

large-scale computers developed at that institution. The Mark III has been designed for greater speed and reliability, more flexible memory facilities, and greater ease of preparation of input data than were found in the earlier computers.

The third in the series of papers on complete systems will be presented by Mr. Palmer and will deal with the type 604 Electronic Calculator built by International Business Machines Corporation. This computer combines an electronic arithmetic element, including a 13-digit electronic counter, with punched-card input and output equipment and additional mechanical storage registers, with the possibility of carrying out automatically a "program" of as many as 20 arithmetic operations.

Since the basis of any successful large-scale computer is a memory having adequate capacity and means for rapid introduction and abstraction of data, the paper on an electrostatic memory for a binary computer by Dr. Williams should be of particular interest. Dr. Williams has carried out extensive research on electrostatic memories, which probably show the greatest promise of any of the basic types thus far proposed for computers, since hey combine the high reading and writing speed of the delay-line type of memory with a very short "access time."

The paper to be presented by Dr. Stibitz on counting computers, while not concerned directly with electronic computers, is nevertheless of great interest in view of the fact that analogue or continuous-variable computers have received so little attention since the development of high-speed digital or discrete-variable types. Dr. Stibitz proposes a new type of computer which combines the more accurate elements of the familiar differential analyzer, such as gears and differentials, with a new type of "function unit," resulting in a computer having the simplicity and low cost of an analogue computer and the higher accuracy of the digital type.

The remaining paper will appeal not only to those interested in computers as such, but will have widespread appeal to all attending the convention, since it deals with the application of computer techniques to a problem familiar to all. Dr. Shannon will discuss the programming of a chess game on a computer. While the possibility of such applications was early recognized, this probably represents the first serious attempt to analyze the programming of such an operation.

WAVE PROPAGATION I—TELEVISION

Chairman, A. Earle Cullum, Jr.
(Consulting Radio Engineer, Dallas, Texas)

42. VHF Television—Propagation Aspects.

Edward W. Allen, Jr., *Federal Communications Commission, Washington, D.C.*

This paper comprises a brief report of the Engineering Conferences on this subject held by the Federal Communications Commission in November and December, 1948, and of the subsequent work of the ad hoc committee in reducing our present knowledge of vhf propagation to workable standards for the allocation of vhf television stations.

43. Propagation Variations at VHF and UHF.

Kenneth Bullington, *Bell Telephone Laboratories, Inc., New York, N. Y.*

The variations of received signal with location (shadow losses) and with time (fading) greatly affect both the usable service area and the required geographical separation between co-channel stations. An empirical method is given for estimating the magnitude of these variations at vhf and uhf. These data indicate that the required separation between co-channel stations is from 3 to 10 times the average radius of the usable coverage area, and depends on the type of service and on the degree of reliability required. The application of this method is illustrated by examples in the mobile radiotelephone field.

44. Propagation Tests at UHF.

Joseph Fisher, *Philco Corporation, Philadelphia, Pa.*

This paper reports the results of broadcast propagation over varied terrain at both 500 Mc and 3,300 Mc. While the principal interest was in television broadcast coverage in the 500-Mc band, data were also taken at 3,300 Mc, using pulse transmission, in order that certain trends apparent in the 500-Mc region might be carried to sufficient extremes to permit reliable evaluation.

The 500-Mc tests were made in the Washington, D. C., area and utilized the signal transmitted by the experimental RCA television station. The mobile television receiving equipment designed by Philco Research Division was mounted in a station wagon to facilitate quick setup. There were provisions to measure field strength, and the picture quality was analyzed by competent observers.

The 3,300-Mc tests were made in the Philadelphia area. The field equipment included means for measuring field strength and photographically recording the attenuation and time delay of multipath signals.

45. A Test of 450-Mc Urban-Area Transmission to a Mobile Receiver.

A. J. Aikens and L. Y. Lacy, *Bell Telephone Laboratories, Inc., New York, N. Y.*

Measurements were made of transmission at 450 Mc in New York City using frequency modulation. Comparison was made with transmission at 150 Mc using the same modulation. Effective radiated powers were about equal. A-B tests (direct comparisons) were made with the receivers installed in a moving automobile. The transmitter and receiver used at 450 Mc were developed especially for the job. The receivers used at the two frequencies had substantially the same noise figures. The tests permitted estimates of the relative magnitudes of the shadow losses at the two frequencies and included measurements of rf noise and signal-to-noise ratios. Subjective tests of circuit merit comparing the two frequencies were made by a number of observers.

46. Echoes in Transmission at 450-Mc from Land-to-Car Radio Units.

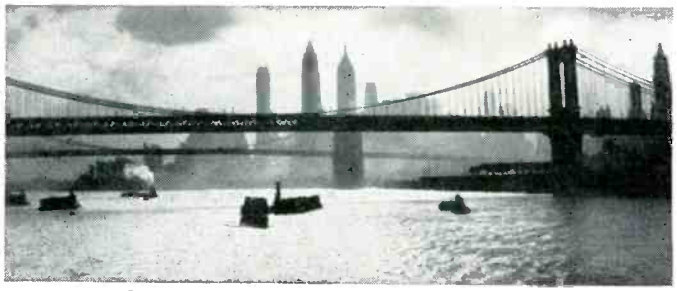
W. R. Young and L. Y. Lacy, *Bell Telephone Laboratories, Inc., New York, N. Y.*

By the use of short pulses of 450-Mc carrier, the echoes which appear in transmitting from a land station to a moving car in New York City have been investigated. The results, which show the multiple-path nature of transmission, are presented in sample and in statistical form. They are of use in considering the possibilities of systems employing a wide modulation band.

SAN FRANCISCO—from p. 11

tend ourselves as some one had to stick around to run the store. We understand that it was highly successful and well attended. Duke Furman has had a very tough time of it of late. While packing up the gear on a field pickup over in Pleasanton he slipped and fell with the result that he ended up in the hospital with a concussion and an injured back. That was about three weeks ago and he has just been released to go home. He is still under the doctor's care though and we all wish him well and a speedy recovery. Vacations are under way here.

By way of an apology for the shortness and lateness of this column we have had our own troubles at our house. My little daughter fell and fractured her neck. She has been in the hospital for quite some time and on her release will be in a trick brace for several months. This has taken a lot of my time and energy and have been more or less up on cloud eight ever since it happened. This will probably be my last column anyhow as we will have a new set of committees appointed soon. I hope that the next character that gets this job does better writing than I ever did. I just ain't a writer, and don't think it ain't been charmin'. It ain't!



NEW YORK—By Geo. Anderson

Off Scale Peaks From the AM Field Department

George "DOC" Robinson, back from his annual vacation, has gone off again—taping his merry way with Bill Chaplin and is viewing Niagara Falls. Nope it is not a Honeymoon, but from the voucher you might think so. Jack "DC" Braverman busily engaged in satisfying Vincent Lopez and wondering how many more years he will be in the Field before he goes on an OUT OF TOWN TRIP.

In line with the current TVI—to the uninitiated—"Tennessee Valley Indians" or "THOSE VIDIEO IDIOSYNCRACRACIES," Harold "Soupie" Campbell reports that his 2 and 20 meter transmitters no longer bother the neighbors' receivers, and Harry Grelck's HEARING AID LISTENER complains that since Harry has changed the feed line to CO-AX he no longer can listen to Harry's nitely chats on two meters; while George "Andy" Anderson still hasn't stopped talking about how the Telephone Company eliminated the TVI from his 75 meter transmitter by changing his fone.

James "Jaimie" Hackett reports that DX on 20 still keeps rolling into W2NT and the list of countries worked is increasing by leaps and key clix.

Harry "I just came back from Miami" Alexander retorts that the Orange Juice and Shoe Lace concession on the streets of Miami was very prosperous and would have come in mighty handy around the first of May.

We haven't heard anything lately from our traveling Tape reporter Harold "Pretty DOOD" Schneider except that it hasn't rained too much and his new house looks mighty nice.

One sunny afternoon a few days ago, while the lads in the shop were quietly concentrating on the scratch sheet—the peacefulness was interrupted by an artillery barrage and Harry Grelck was heard shouting for the Battle Station alarm, while Jack Braverman grabbed a fist full of a key and started an SOS on 500 meters and George Anderson was seen looking around under a bench for his Air Raid Helmet. Soupie Campbell looked up and remarked that perhaps a few batteries might have disappeared. Upon investigation it was learned that six cells in four ABC batteries had blown their TOPS.

And so in closing we notice that New York Field Supervisor Jacobson's superlative STATUESQUE BLONDE Secretary has come into our little doodle shop, and we bid you all a-doodle!

DEADLINE is 2nd OF EVERY MONTH. EXAMPLE: COPY RECEIVED MARCH 2nd APPEARS IN THE APRIL ISSUE, IN THE MAIL APRIL 1st.

News Along the MOHAWK — By JOHN F. McMAHON

Yours truly having found out too late the wisdom of keeping one's month shut at the proper time, will try to set forth some of the happenings, quips, etc., of the past few weeks or perhaps, months.

The chapter held a general meeting on Thursday, the fifth of May, for the express purpose of electing a chairman and councilmen. The turnout was far from sensational, but sufficient for the purpose intended. All the members present expressed a desire for hundred per cent turnout at the next general meeting so what say men? It will be appreciated if all the fellows who couldn't make the last meeting will try to be at the next one.

Before I get away from the subject, I'd like to express the thanks of all the entire membership of Mohawk Chapter to Don Morey who has graciously accepted the chairmanship for one last year. We know it takes a lot of Don's time and feel that he is being very unselfish about it. I know he can count on us to help out in any way possible.

Now, a few words to the hams in our midst. I think we have more hams than non-hams, if I'm wrong, please correct me.

Newt Barnes has set up a very effective wire beam for 20 Mtr. fone & c.w. He has gotten very favorable reports from Japan and South Africa, which isn't too bad at all. Of course, that K.W. the boy is running to it doesn't do any harm.

Marce Reeds, WGY Studio, seems to have discovered the use of the word, if I may call it that, Nabet as a sort of D-X open sesame. Not long ago, Marce called a ZC in Palestine and signed Nabet to his call. The ZC came back and the lads had quite a nice QSO. The ZC, an American, is a former NABET member from N. Y.

I wish some of the W6 members would give W2ZMA and W2TTN a break, they've been looking for a west coast contact for so long it isn't even funny. Any interested parties will find them on 40 cw almost any time.

Some of the West Coast hams have probably heard W2DEL. Hort breaks in on their kilowatt conferences at times.

I have been thinking that some of the fellows might be interested in what the other fellow is doing, what kind of equipment he is using, etc., a word to your local councilman would be a big help in getting something like this started. Just as an example, I am at WRGB tele Xmtr. We have a new G.E. TT-6A and run two and a half KW of audio to it, plus five KW of video. It seems to be a pretty fine outfit and we haven't had any trouble so far, except tube failures which are to be expected at the higher frequencies. We are on channel four which is low band tele, but pretty high alongside the AM frequencies. The antenna is an interesting job which some G.E. engineers dreamed up, a clover leaf deal patterned somewhat after the RCA job; we use two bays for video and one for audio. It seems to do a good job of getting us out and we are satisfied. Enough of that; maybe you can see what I mean from that short discourse.

I had an experience the other day which made me sheepish for a couple of days. I heard one of the boys on ten phone and was amazed to hear such a weak signal from him. He runs a full gallon, but that day I wasn't even hearing an ounce. Not having any gear on ten, I called him and asked if the rig was on fire or something and when the boy heard I was listening to him on ten, he just laughed and said: "Hell, kid, that's my second harmonic, I'm on twenty phone! How do you like that?

Some of the lads in the Capitol district have been wondering when a certain local station which has been advertising itself as "soon to be 50,000 watts," is going to get that Xmtr. on the air.

It seems to be the general opinion in these parts, that this is a fine time to get behind our unions and stand real close, for the next couple of years. Recent production slow ups in various industries, would seem to indicate that capital is trying to serve notice on labor that the ball is over and that wage increases, etc., are going to come to a screeching cease. Without our unions we would have a rough time in keeping what we have now, let alone advancing our cause; MOHAWK MEMBERSPLEASE NOTE.

Jack Hahn, WGY studio, seems to have licked the problem of matching a tele Rcvr. to a folded dipole without 300 ohm ribbon. He uses a bundle of 72 ohm ribbon, some hookup wire and a couple of whatnots. He actually gets a picture with that stuff, too, even if a couple of people nearly did strangle on the Xmission line. Jack had it runout through doors, windows and anything else that got in his way.

If any of the fellows from Central Radio School classes 134 or 135, 1948 happen to see this, I would appreciate a card to J. McMahon, care WRGB Schenectady, N. Y. Some of the other lads are up here, too.

A couple of months ago the fellows at South Schenectady, WGY, WGEA, WGEO, WGEX, Xmtr., became fed up with the doggy odor emanating from Beulah their mascot. Some of them got together and doused the poor mutt with toilet water and for the next few days she was almost a case for a psychiatrist. The hound didn't know whether she was a dog or a burlesque queen. Nature will out though, and it wasn't long till she was her old doggy self again.

Bob Gotshall at WRGB, MCR, had an interesting complaint not long ago, seems a woman called wanting to know why she couldn't get a good picture after she had adjusted all the little knobs on the rear of the rcvr; Bob of course referred her to her service man.

Ray Lynch, WRGB cameraman, was married on the seventh of May; the bride was Eileen Hanrahan also of WRGB. The best of everything to two nice people.

The lads at WGY control had another "West of Denver" incident last week. It seems that some joker was casually plowing along with his bulldozer and before he quit, had unearthed enough cable to knock a couple of nets out for a while.

The boys are still trying to find out just where the trouble was when the failure was reported West of Frisco or West of Los Angeles.

Some of the Mohawk members who are members of the Albany Amateur Radio Club, are looking forward to a field day, the 18th and 19th of June. Sounds like a good deal, after being cooped up over a hot Xmtr. all winter.

I would appreciate a few words from any Mohawk boys, who happen to have anything of interest for the journal. I'm not doing too brightly by my little old self, so what say fellows?

There seems to be some speculation at WGY control, as to the price of peroxide in Schenectady. Anyone know anything about it?

Guess that's about all for now, C.U.L. —Mac.

DETROIT NABET NEWS

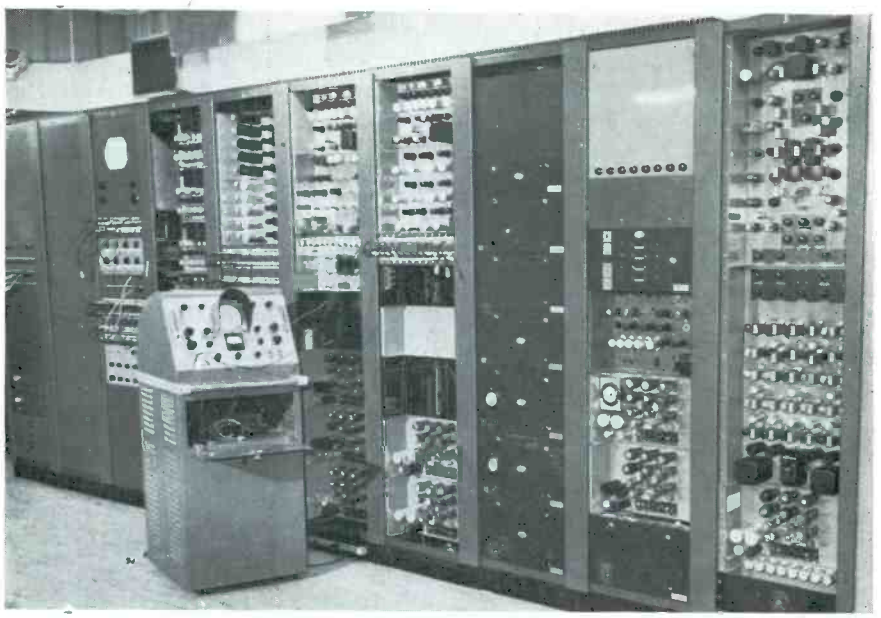
TV at WWJ - TV—By WALT BAKER

Detroit Chapter's meeting last May 19 in the Pan-American room of the Book Cadillac was quite an occasion. It started off with good news, accomplished a great deal with dispatch, and rounded off with a swell get together. The boys from WJLB and WBBC were on hand to cast their first votes as members of NABET, their contract having been finally signed as of May 2. A hearty welcome also was extended to several of the WJBK gang who are already considered to be blood brethren.

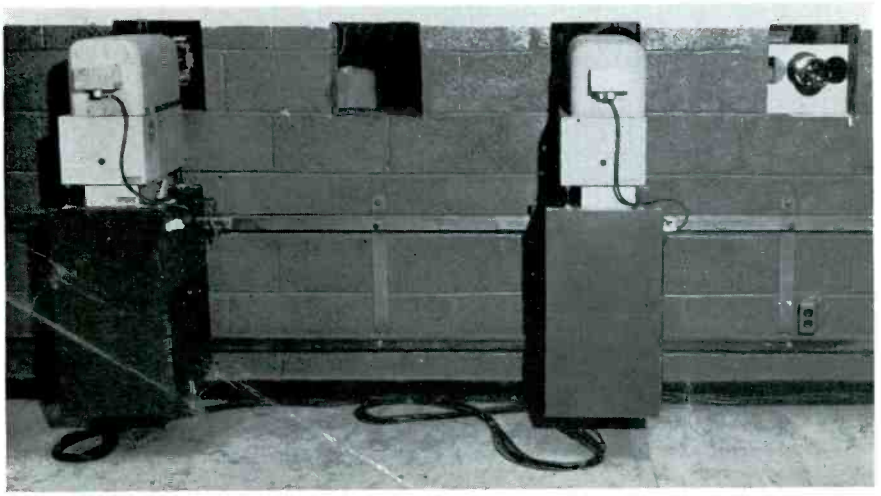
As per usual, National Representative George Maher present for the impending WJBK jurisdictional hearing, was called upon to give a verbal account of NABET-wise progress. And chapter members were happily surprised to learn for the first time that WKMH engineers have applied to the Labor Board for a NABET election. Score five for the organizing committee! The date has been set for June 2.

Officer elections, main business of the meeting, were handled with dispatch. Davey Stewart, who took over the trials of office when 'Roge' Ellis was hospitalized, was unanimously reseated. A rising vote of appreciation was afforded 'Roge' for his sturdy work in behalf of the chapter these past terms. A motion also was proposed and carried that dues of the chapter chairman and the secretary-treasurer would be paid out of local dues. And high time, too!

Here is some of that dope about WWJ-TV we promised you a while back. Like most of the first few stations to light the now blazing star of television, WWJ-TV started with a flash and a roar—and a five camera Dumont Ike chain for studio equipment. Today, far from being a white elephant, these obsolescents have been transformed and adapted into the most efficient and flexible main control equipment in the country.



TV MCR Bays—Audio and Video. Left to right, bay 1 and 2, audio facilities. Bay 3, Air Monitor and Monitor Switching. Bay 4 and 5, Distribution Amplifiers. Bay 6, Sync Stabilizing Amp (Line), Line Switching Units. Bay 7, Net Stabilizing Amp and Sync Adder unit. Bay 8, Power Supplies. Bay 9, Monoscope. Bay 10, RCA Sync Generator.



TV Film Cameras. Film cameras mounted on Projection Booth wall with rollers and track to facilitate quick changeover.

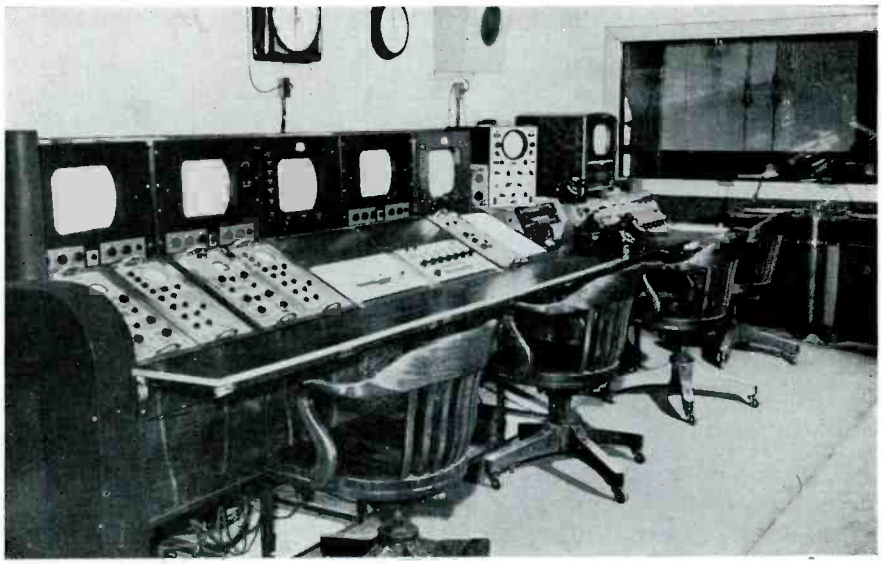
Two of these cameras, funcitoning as an original chain, rest in a standby studio readied for use on emergency and surplus programming. The rest of the chain has become the nucleus of a most unique control station. Five twelve-inch monitors, stripped of their brutal, murderous power supplies and invested with simple, inexpensive flyback jobs are lined in a row to reveal line and preview operation of the several channels available. Switching problems due to several varieties of video composite have been licked by sync adapters and adders evolved by the research dept. Other adapters have enabled the use of the indomitable RCA Master Sync Generator.

The dependability of the Iconoscope for film purposes has been utilized to the fullest extent and its usefulness widened by several homegrown improvements. Distribution amplifiers in tandem are

used liberally thruout the system, and a maze of coax fittings appear on terminal boards to allow maximum flexibility.

The audio switching problem has been thoroly licked by an RCA 125B console which, except for a few human failures, has handled every situation GVGR presented to it. But this is only the nerve center, for WWJ-TV boasts two more camera chains—both up to date remote Orth equipment. One chain is used exclusively for remote pickups while the other is doing yeomanlike service carrying the bulk of the studio load with weekly jaunts to the auditorium for participation shows and occasional emergency remotes.

Photo right, TV Master Control Panel, Audio and Video.



ROCKY MOUNTAIN NEWS

—By GEORGE SOLLENBERGER

TV In Denver

May 22nd saw the advent of TV in Denver in the KOA studios. The VIDEO ASSOCIATES, Stan Neal, Al McClellan, Charlie Eining, and Kenny Raymond put forty minutes of entertainment on two viewing screens tied by coax to the camera equipment in Studio A.

All equipment was constructed by the ASSOCIATES in their spare time and the use of the studios was donated by NBC. The 250 line definition was very acceptable and all those who attended were impressed by the clarity of the pictures. Studio equipment was used for the sound portion of the demonstration.

Because of the limited space, only friends and families were invited. The publicity in the local papers brought inquiries as to when Denver could expect to see pictures on the air. The response of the public shows that they are interested in it beyond the mild stage and will no doubt be quick to accept it when it does arrive.

Friday, June 3rd, Colorado Springs had their first demonstration also by the VIDEO ASSOCIATES. This super-production was arranged by one Joe Rohrer, well known to many of this clan. All equipment was transported by car to a hall rented for the demonstration and from the comments heard after the show it, too, was well received and for the relative size of this vacation city a good bit of enthusiasm was shown.

CQ CW

C. W. Drebing, Chapter Secretary-Treasurer reports that he has had no response to his request for a tape machine with which to master the code as previously noted in this column. Carl is also vacation relief at KOA and may be reached at this address if an old Instructograph is gathering dust in your basement. The Drebings now reside at their new home in Aurora east of Denver.

Most of the transmitter crew have taken advantage of the fishing season just opened and with all of the beautiful mountain streams and lakes, the 50KW boys have had little trouble getting their limits. Also the paving job, underway for several months, has been completed and the grounds look a bit more presentable during this, our rainy season and we have had a bit more than usual.

New cars recently mentioned in this column as having been purchased by various members of the crew have already run afoul of various gremlins. "Barney" Nesbitt's hot-rod Hudson gave him considerable trouble a few weeks ago when the distributor went haywire. After a push (50 miles) and a lot of encouragement he limped back to Denver. After retiring the car to the agency they ran up a fast bill for about eighteen bucks but would Barney pay? Nope! Next day he was down at the garage sans mechanics union button and took out the unnecessary parts and showing them what was wrong with the job they did. Result: bill now read only $11. Further information on this thrifty idea may be had by writing to him c/o KOA transmitter, Aurora, Colorado.

Thompson sold his old antiquated (1937 or so) automobile and put his new Chev in the garage one nite. The vibrations of the motor which runs the windshield wiper caused the pet camp stove stored overhead to fall on the hood with a resounding clank. The dent was deeper than if the old job had been parked in the space but what can one expect from this post war stuff.

Roy Carrier has ordered new glasses as the fine type in the stock market quotations columns causes him to strain his eyes but the things are paid for with the earnings of his manipulations. The Daily Racing Form may be purchased from Mr. Newbold on subscription.

Mr. and Mrs. Eining were married at the Cathedral May 23rd and so the engineering dept. has a new secretary. Charles, nevertheless carries on with the VIDEO ASSOCIATES though on a reduced time schedule. Mrs. E. read of the televising of girls in bathing suits where the material didn't materialize and doesn't want Charlie to burn out the CR in his monitor unit.

This writer may be on the air yet. A 465-A cracked across the base thereby reducing radiation and/or tune up time to non-existance. One is forthcoming and WØMTD will soon be on 20. And so with this bit of information we remain.

For Information About

N A B E T

Contact Any Officer.

★ See Page 1 ★

Hoover Group Recommends Transfer of Eight Functions To Labor

The Commission on Organization of the Executive Branch of the Government has recommended transfer of eight agencies and functions to the Department of Labor.

The report proposes these transfer to Labor:

1. Bureau of Employees' Compensation (from the Federal Security Agency.)

2. Employees' Compensation Appeals Board (from the Federal Security Agency).

3. Bureau of Employment Security (from the Federal Security Agency. Placement service and unemployment compensation).

4. Selective Service System, including the Appeal Boards (independent).

5. Enforcement of labor standards in Government contracts (from contracting departments and agencies).

6. Determination of minimum wages for seamen (from United States Maritime Commission).

7. "Prevailing Wage" research to be conducted by the Bureau of Labor Statistics.

8. Division of Industrial Hygiene—certain components only —(from the Bureau of State Services of the Public Health Service in the Federal Security Agency).

On the over-all organization of the Department the Commission referred to its previous reports on Departmental Management, Budgeting and Accounting, Personnel Management, and the Office of General Services. The Commission recommended that the Assistant Secretaries be appointed by the President and confirmed by the Senate, but that all officials in the Department below the rank of Assistant Secretary be appointed by the Secretary.

A summary of the Commission's transfer proposals follows:

The Bureau of Employees' Compensation administers the 1916 act which provides workmen's compensation benefits for civil employees of the United States who suffer personal injuries while in the performance of duty. It employs about 375 persons and has 15 district offices "which could well be housed with other agencies of the Department of Labor." The Bureau's administrative expenses are about $1,500,000 per annum and the estimated expenditures for compensation in fiscal 1950 are about $23,00,000.

The Commission said that "its work in safety, statistics, and industrial standards is allied with other Department of Labor functions. The Employees' Compensation Appeals Board is an intrinsic adjunct to the functions of the Bureau," and should be transferred with the Bureau.

The Bureau of Employment Security administers both the employment service and the unemployment compensation programs. It emplys some 1,030 persons and spends about $6,000,000 per annum in administration. Funds for unemployment insurance are collected by the Treasury Department through a 3-per cent pay-roll tax on employers, although the program is administered by the States under varying State requirements.

The Commission said that 'the only real relationship between unemployment compensation and other functions in the Federal Security Agency (where this Bureau is now located) is that of social insurance. Pay-roll deductions for unemployment compensation and old-age and survivors insurance are enforced by the Bureau of Internal Revenue. Beyond the collection of pay-roll taxes there is no common point of administration. Old-age and survivors insurance is Federal; unemployment compensation is State. The employment function, and with it the administration of unemployment compensation, is part of the labor force complex of functions."

The Selective Service System functions essentially for the purpose of mobilizing the manpower of the country for military service. It is now an independent agency reporting to the President, "yet the President cannot give it over-all supervision." The System's personnel, except in top positions, is entirely civilian.

"To place it under the Secretary of Defense would raise the most serious objections as its operation involves many considerations which require its supervision be not biased in favor of the military. On the other hand, the effect of conscription on the labor force must receive the continual examination which can be provided by the Labor Department."

(Commissioners Acheson, Forrestal, and Manasco dissented on this recommendation.)

Phone Union Merger Discussed in Chicago

The Communications Workers of America, representing 230,000 telephone workers in 40 States, in a 30-day membership referendum voted two to one to affiliate with the Congress of Industrial Organizations.

A CIO charter has been issued to the union. Amalgamation between CWA and other telephone groups in the CIO was scheduled to take place at a convention in Chicago. This will bring the union membership above 300,000 "almost immediately," according to CWA spokesmen. Several unaffiliated phone unions have authorized membership referendums to go into the CIO union.

CWA leaders plan an organizing drive right after the amalgamation convention and predict membership will be "500,000 or more within 18 months."

CWA started operating as a national union in June 1947 after several years of preparatory work. It is a successor to the National Federation of Telephone Workers, started in 1939 as a loosely knit federation of autonomous telephone unions.

Most of CWA's members are employed in the Bell System, American Telephone & Telegraph Co., and its subsidiaries, including manufacturing. The union represents about 15,000 workers in independent phone companies.

About half the members are switchboard operators, approximately one-fifth of the remainder are clerical workers—typists, stenographers, clerks—and in other white-collar categories. Others are mainly craftsmen—linemen, cable splicers, installers, repairmen, building mechanics, janitors, and factory workers.

HOLLYWOOD NEWS

By Norman Dewes

"LIFE IN SAN FRANCISCO"

PART II.

SAN FRAN—is surely the Mecca, the Shangri-La and the Happy Hunting Ground of the gourmet, the gourmand, the potationer and the LOVER of LIFE—there as nowhere else we are SURE, one may sate whatever appetite may call—with grace, abundance and abandon—one may have, too, a life of dignity and urbanity, as is reflected in the very traffic on the street—you are not run down at corners by wildly-driven vehicles, nor are you jostled from the sidewalks by rude and care-not strangers—in short, a place wherein to LIVE, rather than only EXIST—regard, as witness, the *Temple Bar Tea-room,* in an obscure alley in the heart of the City—by day a rather sedate and certainly decorous luncheon spot for ladies in business, but after dark a lusty rendezvous and habitat of the *"Professor,"* who'll drink your beer and curl your hair, with a wink and a story—the bartender, a dour individual and a painter, who'll take you out back where the potato chips are kept and show you landscapes of breath-catching beauty, caught on canvass—then, the little place on upper Broadway, whose name we've forgotten, but wherein the juke box plays nothing but Caruso and the great voices of Italian song, and where you order the most regal of Coffee Royals and put a nickle in the box and the bartender behind the bar outsings Caruso on the record, in volume and heart if not in greatness —and *Original Joe's,* where waiters in dress suits serve anyone the best meat balls and spaghetti anywhere—the place you go when you're alone or low in funds—and *Sinaloa,* the Spanish Cafe wherein a fat and jolly senora dances with you and tells your fortune—and the hatcheck girl emerges in the floorshow and dances like Salome—and the *Chinese Cellar,* where man is all colors—and *Finochio's,* where he is but one —the skyrooms and the dives—and the Bridges and the Bay and the boats and the Cable Cars—and the Hills and the stores and Chinatown and Fisherman's Wharf—and the Home Office of the great Shell Oil Company, wherein at four o'clock each day all activity ceases, and tea is served—truly a City of the World.

PIX—accompanying this ALLEGED colyum depict several aspects of KGO/TV, the ABC television disseminator for San Fran and environs—which, by grace of the ALMIGHTY and *Shorty Evans,* will have had its NASCENCE ere these words are read—the fifth inst. of May, to be EXACT, and WE HOPE Brother *Stevens* of the Fifth Estate, San Francisco Local, will have COVERED the event and will REPORT on same—508 foot tower shot shows a FINE CONTRAST in edifices and a bit of the famous old Sutro Mansion, which perched on a Hill near Twin Peaks and some eight hundred and fifty feet above the City, is a TRIUMPH for the aforementioned *Mr. Evans,* ABC Engineering Chief for San Fran, and houses KGO/TV and FM—*Sutro* is a story in ITSELF, which we DEMAND that Assoc. Ed. *Stevens* extract from *"Shorty"* and forward to *"Stolzie"*—and incidently, *Shorty* is a bit of a story HIMSELF—a very GENIAL-type individual, who manages to manage the RADIO affairs of ABC Engineering in San Fran with a gentle but FIRM hand, and who busy as he ALWAYS is, managed to TAKE CARE of us VERY WELL, even to stealing one of the new RCA LC-1-A speakers from Sutro so that we could have the speaker we were USED to in our booth at the Marine Memorial—then there's *Shorty's* SECHETARIES—EROWLFF EROWLFF!!!—but THEY'RE another story, too, BLESS their little selves!!! NEXT pic shows new KGO/TV studio and crew, ALL SET for snapping—but by THIS time they don't all look so placid and PRETTY—TV has a way of unRAVELing you, we understand—NEXT pic shows XMITTER Room at Sutro, with Station Engineer 'n CHIEF *Harry Jacobs* hard at work logging one of the NICEST test patterns we had seen

To Page 20

ANYWHERE—and installation is really a DILLY, too—new GE rig has simply EVERYTHING, including even faders on the dial lights—we spent an afternoon out at Sutro with our KODAK, and got some WONDERFUL color shots of in 'n outside. . . REST of pix, space permitting, and we're SURE it did, are rather SELF-EVIDENT, we believe—just some other cases where the pic is worth a 1000 words, but you'll have to supply yer OWN or else just LOOK 'cause we doubt if even *Stolzie,* Wolf, Senior Grade that he IS would dare to print the kind of words WE have in mind—BESIDES, *Millie* would SEGREGATE him immediately—then LAST pic shows some of the Hollywood-type boys in the BACK ROOM—all we can say for THEM is that they're THERE, living and breathing—someone happened to wander thru with an extra flash bulb and some film he wanted to use up at the end of the roll and happened to catch a REPRESENTATIVE GROUP in the Lounge at *Sunset 'n Vine,* is the story WE got—fellow about to be christened with the INVISIBLE JUG is dapper *Floyd Wetteland,* Senior Supervisor for NBC Master Control, which shows the kind of LEADERS we have out here—BACK to the OTHER picktures.

WELL—have that feeling that our SPACE is running out, so had better TIE this OFF—besides, our hands are running out of FORE fingers—and speaking of FOUR FINGERS, there is a LOT to relate yet about San Fran but fear it would be SHEAR NONSENSE to try—would like RIGHT HERE however to deeply THANK all those many NICE PEOPLE up there, on the sincere behalf of *Bill Morrow* and *Murdo MacKenzie, Jack Mullin* and *Larry Robertson, John Scott Trotter* and *Ken Carpenter, Jim Burton* and ourself—and BING—for making *Philco Radio Time's* visits most pleasant and successful—and "those" include the girls in Mimeo and Traffic, the patient fellows in Master Control and Recording, Engineers *Mark Dunnigan* and *Norm Wallis,* who did all the WORK, *"Pop" Hudson* of the Langevin Company and his ACE P-A. man *Tom Edwards* who made all the NOISE, the stage crew at the Marine Memorial, *Sid Blank* and OTHER pore unfortunant engineers who got caught with the CHAUFFEURING, and OF COURSE, *"Shorty"* and his bevy of TOOTHSOME secretaries, NAMELY *Aileen Delany* and *"Shmoe"*—that *Aileen* is an Irish lass, and one of the CUTEST little lasses we've EVER SEEN, but we discovered JUST in TIME that she is under the aegis of a 190 lb. football player from STANFORD or some such—pretty narrow THING there, for we were just about to BEGIN OPERATIONS—anyway, Thanks 'n Thanks 'n Thanks 'n THANKS—and we truly hope that we'll be seein' you-all AGAIN soon—but not too TOO soon, for our ULCERS are acting up again and we still owe several payments to ABC on our EXPENSE ac-

Left to right, standing—Ray "Fergie" Ferguson; Wally Rippel; "Howie" Cooley, and Ralph Reid. Sitting, Floyd Wettland.

counts—but BY GAWD we LIVED, eh *Mark, Larry, Jack, Jim, John, Ken, Murdo, Tom, Norm, Jane, Fay, Betty* et AL!! —wonder what AL'S last name was—ANYWAY, Happy, Happy Cappuccino!!!!! 'n BCNU.

—o—

SECRETARY OF LABOR SAYS—

Because of the present international picture, it becomes necessary to do everything in our power to assure the successful functioning of our economy and the happiness of our people.

A society, like an individual, cannot be healthy, confident, and strong when any component part is weakened.

This country cannot fully implement its foreign-aid commitments or vigorously pursue a foreign policy designed to strengthen the democratic forces abroad if our domestic policy suffers or condones widespread unemployment or substandard living conditions for millions of our workers.

The Fair Labor Standards Act is one of our more important instruments for preventing either of these from occurring. In placing a ceiling on straight-time hours and a floor under wages, the Congress showed its intent to spread employment and maintain a minimum standard of living. In terms of today's economic conditions, the Wage and Hour Act is as outmoded as a 1938-model tank or airplane in an atomic era.

Therefore, as a highly useful and valuable economic instrument for the maintenance of our free enterprise system, the Wage and Hour Act should be amended. It is my strong recommendation that the minimum wage should be raised to 75 cents an hour with higher rates wherever possible up to $1 an hour, millions of people not now under the act should be covered under its provisions, and the child-labor provisions should be strengthened.

Heading Cuts for Chapter news columns. Chapters without regular heading cuts and desiring same, should send in photo, cartoon, or drawing of subject matter that they wish used to identify and distinguish their column.

A "Brand New" SOLUTION TO YOUR AUDIO MEASUREMENT PROBLEMS

FEATURES

FREQUENCY RANGE:
20 cycles to 20 KC.

ACCURACY:
Accuracy is ± 0.1 db, from 20 cps to 20 KC.

OUTPUT LEVELS:
Ranges of output levels—+4 to —110 db and —10 to —124 db in steps of 0.1 db.

ACCESSIBILITY:
All components accessible from front of rack panel—for ease of servicing.

IMPEDANCE RANGES:
(a) *Source Section*— 600-150 ohms internally terminated.
600-250-150-30 ohms unterminated.

(b) *Load Section*—600-250-150-16-8-4 ohms.

Daven's Moderate Priced Transmission Measuring Set

This is the instrument for which you have been waiting! For accuracy and efficiency, the Daven Type 11 A gain set, will fill your bill. Incorporating many of the features employed in more expensive models, this unit may be used to make all the precise measurements required by the FCC Proof of Performance Regulations.

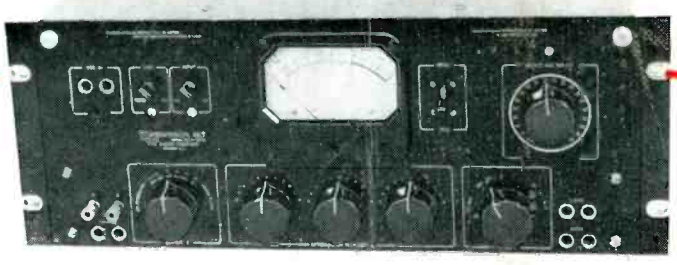
A new design feature, permits the servicing and inspection of all components from the front of the panel, with a maximum of ease and in a minimum of time. This is also a direct reading instrument, entirely eliminating time-consuming computations.

It is no longer necessary to use makeshift equipment for determining the transmission characteristics of audio systems. The Type 11 A gain set has been priced low enough to come within the reach of the most limited budget.

APPLICATIONS

- AUDIO GAIN MEASUREMENTS.
- AUDIO LOSS MEASUREMENTS.
- MEASUREMENTS OF MATCHING AND BRIDGING DEVICES.
- COMPLEX CIRCUIT MEASUREMENTS.
- MEASURING MISMATCH LOSS.
- FREQUENCY RESPONSE MEASUREMENTS.

WRITE TO DEPT. BE-5 FOR ADDITIONAL INFORMATION.



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