THE BROADCAST ENGINEERS' JOURNAL
ED. STOLZENBERGER, EDITOR
116-03 91ST AVENUE, RICHMOND HILL 18, N. Y.

Sec. 562, P. L. and R.
U. S. POSTAGE
PAID
New York, N. Y.
Permit No. 2961

OFFICIAL PUBLICATION OF THE NATIONAL ASSOCIATION OF BROADCAST ENGINEERS AND TECHNICIANS

The Broadcast Engineers' Journal

In this Issue --

- FM — Part I
- Latest Television Transmitter
- 1947 I.R.E. Papers
- Modulation of AM Transmitters
- News — FM — Television — Industry

VOL. 14 No. 6
JUNE 1947

SINCE 1934 . . . OF, BY, AND FOR
THE BROADCAST ENGINEER

A Major Advancement in the Recording Blank Field . . .

10 Year Guarantee

GOULD-MOODY PROFESSIONAL QUALITY "BLACK SEAL" ALUMINUM INSTANTANEOUS RECORDING BLANKS . . . . AT NO INCREASE IN PRICES!

After prolonged research and experimentation, we have introduced technological improvements into "Black Seal" blanks that not only increase the life span, but materially enhance the other fine characteristics of these blanks. And so positive are we of the performance of these perfected "Black Seals" that we've placed an unconditional guarantee of ten years on each one of them.

What Does This Guarantee Mean to You?

It means that Gould-Moody "Black Seal" blanks will not rip up, disintegrate or powder after the first playing if kept in storage for any long period of time. It means that atmospheric conditions and changes, moisture and dampness, and old age will have no effect on blanks bearing "Black Seal" labels. It means that you'll be in no danger of losing valuable recordings in what, up until now, you have considered your safe library of recordings. And it means that you can expect the finest reproduction from the finest blank you have ever had on your turntable.

You Can't Afford To Be A Recording Isolationist

Whether you're a recording engineer in New York, Burbank or Witchita . . . no matter how well satisfied you are with your present blanks — you can't afford to be a recording isolationist now. Try these new Gould-Moody "Black Seal" blanks. Cut a few. If, for any reason whatsoever, you do not like them, you can return them at our expense.

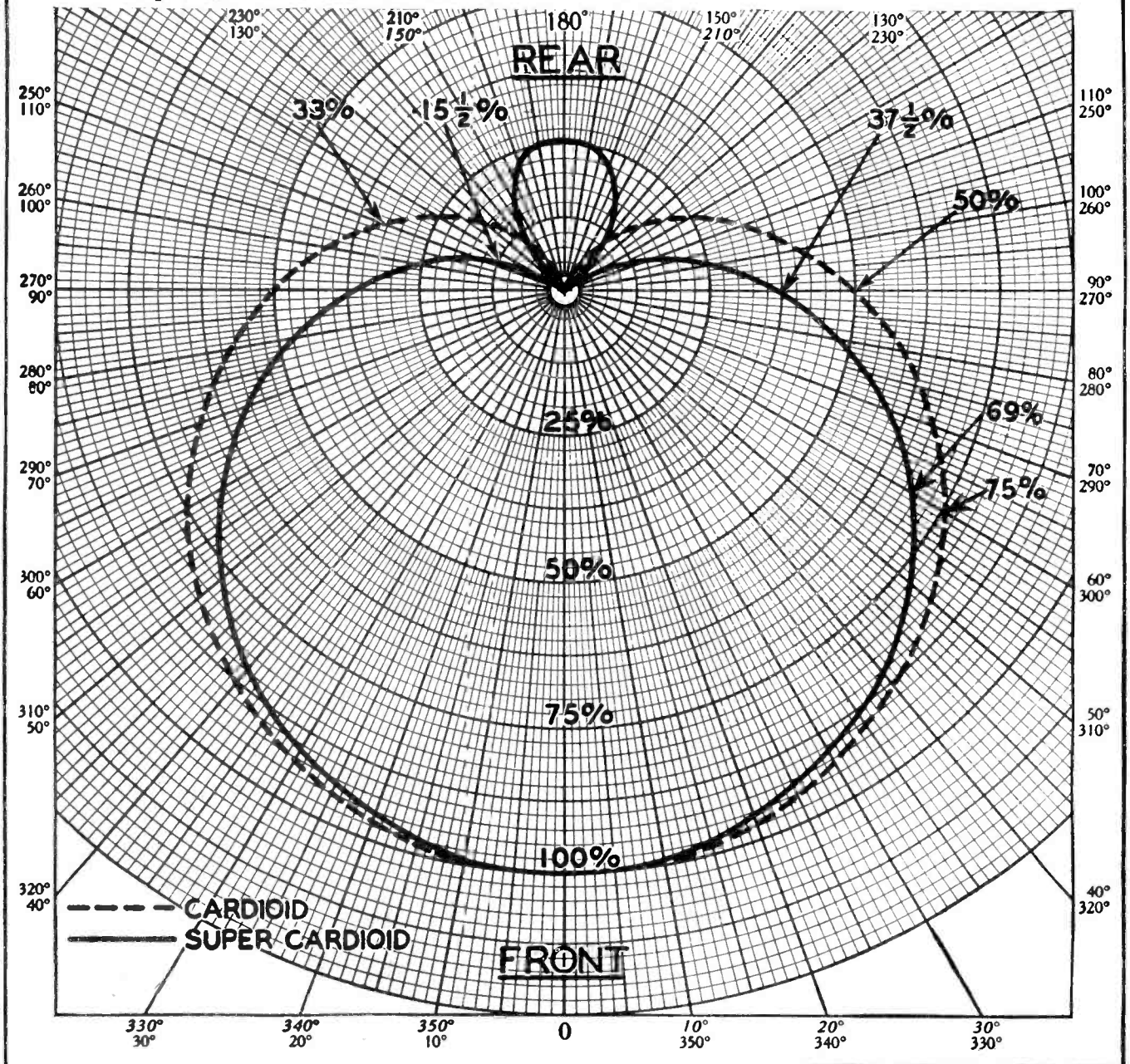
GOULD-MOODY'S PREFERRED RESHARPENING SERVICE
restores the point on your precious recording needle
SAPPHIRE! STELLITE!

Exacting workmanship assures lower surface noise and longer wear. In fact, needles and styli refinished by Gould-Moody are frequently reported to last longer than the original points. And the extreme accuracy with which that last 3/1000ths of an inch is shaped enables the needle to fit with microscopic perfection into the groove, thereby reducing record wear to minimum. This saving, in many cases, exceeds the cost of Gould-Moody resharpening.

THE GOULD-MOODY COMPANY

RECORDING BLANK DIVISION — 395 BROADWAY, NEW-YORK 13, N. Y.

. . . Comparative Graph Proves SHURE Super-Cardioid Microphone twice as unidirectional as Cardioid . . .



Here is the difference in pickup patterns between the Cardioid and the Shure Super-Cardioid Microphone. Maximum sensitivity (100%) is achieved by sound approaching the Microphone, directly at the front. At 60° off the front axis sensitivity of the Super-Cardioid is only slightly less than the sensitivity of the Cardioid (69% against 75%). The Super-Cardioid insures, therefore, a wide range pickup at the front. Beyond the 60° angle, the sensitivity of the Super-Cardioid decreases rapidly. At 90°, the sensitivity of the Cardioid is 50%; the sensitivity of the Super-Cardioid 37½%; 12½% less. For sounds approaching at a wide angle at the back (110° to 250°) the sensitivity of the Cardioid is 33%; the Super-Cardioid 15½% or 17½% less. It has been proved mathematically that the ratio of front to rear pickup of random sound energy is; *Cardioid 7:1; Super-Cardioid 14:1.*

This additional directional quality is important in critical acoustic work. The Shure Super-Cardioid, employing the exclusive "uniphase" principle, gives such performance in a single, compact rugged unit.

SHURE BROTHERS, Inc.

Microphones and Acoustic Devices

225 W. Huron St., Chicago 10, Illinois • Cable Address: SHUREMICRO

SHURE

THE BROADCAST ENGINEERS' JOURNAL

Ed. Stolzenberger Editor and Business Mgr.

Editorial, Advertising and Circulation Offices:
116-03 91st Avenue, Richmond Hill 18, N. Y.
Telephone: VIrginia 9-5553

Volume 14, No. 6 409 June, 1947

TABLE OF CONTENTS

The Broadcast Engineers' Journal is a privately printed monthly publication issued by NABET Publications. Address all communications to Publication office: E. Stolzenberger, 116-03 91st Avenue, Richmond Hill 18, L. I., N. Y. Telephone VIrginia 9-5553.

Advertising rates and information supplied on request. Subscription, $2.50 per year; $4.00 for two years. Single copies, except Christmas Yearbook, 35c; Christmas Yearbook, $1.00. All remittances in advance. Foreign: add postage. Back copies 50c, back Yearbooks, $2.00.

NATIONAL N.A.B.E.T. OFFICE
Room 501, 66 Court Street, Brooklyn 2, N. Y.
A. T. Powley, President

NABET ACTIVITY

DURING the past month, NABET has signed contracts with WOR, RCA/Victor, NBC and ABC. WOR's contract calls for an increase in pay scale of 12½%, the RCA/Victor contract for 15%, the ABC and NBC contracts for 11½%. The overall yearly increase in payrolls for these four groups amounts to over $400,000.00.

A. T. POWLEY

On May 2nd, an election was held by the NLRB for radio engineers employed at Station WRNY, Rochester, New York, which resulted in the employees choosing NABET as their bargaining agent. Contract proposals are being compiled under the guidance of Charlie Snyder, Rochester Chapter Chairman.

A. T. Powley

* We learned from Cliff Gorsuch, NABET National Rep., that Mr. Otto B. Claus, Jr., replaces C. Edward Jung as Chairman of the Baltimore Chapter NABET.
* Westinghouse-UE-CIO signed for 15c per hour increase for 75,000 employees.
* WJZ, ABCO Flagship, announces first quarter 1947 biz increase of 13%.
* Justice Dep't reported about to bring anti-trust suit asking AT&T Co. to divest itself of W.E. Co., similar to Pullman Co. suit.
* New York State Commerce Review reports business activity continuing at high levels, and further increases are being recorded in most segments of the economy.
* NABET President Powley announced that NABET has distributed $9,734.29 to its Westinghouse NABET broadcast engineers at stations WBZ, WBZA, KDKA, and KYW. The payments represent loss of salaries during the Westinghouse-NABET strike of Sept., 1946.
* RCA reports 1947 First Quarter profit 48% over 1946, after taxes.
* AFM-Petrillo-4-Network contracts signed, reported as follows:

Formerly	*New Rate*	*% Increase*
$126.50/wk	$151.80/wk	20
$132.50/wk	$158.70/wk	20
$165.00/wk	$191.45/wk	16

* Petrillo now expected to ease ban on duplication of AM programs on FM stations of same employer, and to with-

(Continued on Page Twenty-two)

National Association of Broadcast Engineers and Technicians

The only Union that is 100% Of, By and For the BROADCAST ENGINEER

Attention Broadcast Engineers!

- NABET is a dignified union *worthy* of your support.
- NABET is an *effective* union, Of, By, and For the Broadcast Engineer *exclusively*, operated upon and dedicated to the principle that every member has a *right* to know what is going on in the union's "front office."
- NABET is controlled by its *members;* they have the right to vote on all matters of union policy. As a NABET member, you would have the *right* to Okay any actions which your President might take.

Contact any of the following officers for further information

A. T. Powley, President
Harry C. Hiller
Nat'l Sec'y-Treasurer
66 Court Street
Brooklyn 2, N. Y.

James H. Brown
Vice President
6000 Sunset Boulevard
Hollywood 28, Calif.

Cliff Gorsuch
National Representative
66 Court Street
Brooklyn 2, N. Y.

Charles L. Bennis
Apt. DA-2
117-14 Union Turnpike
Kew Gardens 15, N. Y.

Harold V. Brandt
19 Elm Street
Brecksville, O.

Otto B. Claus, Jr.
9913 Wesley Avenue
Baltimore 7, Md.

Reid R. Davis
18 Squirrel Hill Road
Roslyn Heights, N. Y.

J. Willard Dean
217 E. North Street
Raleigh, N. C.

Garland S. Dutton
1225 Clarkson Street
Denver, Col.

Roger C. Ellis
820 University Place
Grosse Pointe, Mich.

George Gebhard
134 William Street
Watertown, N. Y.

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

John H. Hogan
9312 Sudbury Road
Silver Springs, Md.

William Justin Flanders
2 Holly Street
Hingham, Mass.

Wm. H. Johnson
100 E. Manda Road
Havertown, Pa.

John R. McDonnell
252 Oakdale Avenue
Mill Valley, Calif.

Don Morey
Apt. 26-A, 3 Circle Lane
Albany 3, N. Y.

Donald A. Muir
1200 W. Colvin Street
Syracuse 7, N. Y.

Walter L. Payne
68-07 Colonial Avenue
Forest Hills, N. Y.

Clyde M. Reed
363 Olancha Avenue
Brentwood, Pgh., Pa.

Frank C. Schnepper
3508 West 97th Street
Evergreen Park, Ill.

Charles Snyder
106 Pembroke Street
Rochester 7, N. Y.

FM—Part 1

How FM will affect the presently employed AM Broadcast Engineer

By Frank Burns

NUMEROUS articles have been written arguing the advantages and disadvantages of frequency modulation. They included the pros and cons of offering a 15 kc response to a receiver owner who has a tone control with a bass position. They also gave the receiver owner's reason for having the dynamic range experienced in a concert hall—and his next door neighbor's reason for not wanting him to have it!

It is not the purpose of this article to add to these discussions. Rather, we take cognizance of the fact that FM is a reality and in response to many queries, will attempt to discuss what differences in operating technique will be encountered by the engineering personnel in operating an FM rather than an AM station.

To begin with, FM is basically a system of modulation where the instantaneous radio frequency varies in proportion to the instantaneous amplitude of the modulating signal and is independent of the frequency of the modulating signal.

For example, assume an unmodulated carrier frequency (center frequency) of 98.1 mc and a modulating signal consisting of low frequency sine wave of sufficient amplitude to cause 100% modulation (±75 kc deviation as specified by the F.C.C.).

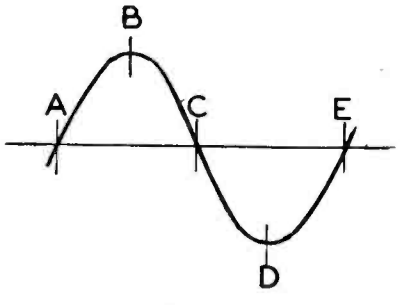


Fig. 1
Figure 1 shows one complete cycle of the modulating signal.

At point "A" where the waveform is on the zero axis, the carrier is at its center, or unmodulated frequency of 98.1 mc. As the wave increases in amplitude towards point "B", the carrier frequency increases in direct proportion until when point B is reached the carrier has arrived at its positive 100% modulation frequency of (98.1 mc + 75 kc), or 98.175 mc. As the amplitude of the modulating signal decreases, the carrier frequency decreases until at the zero axis, point "C", the carrier is back to its center frequency of 98.1 mc. The waveform now starts to increase in amplitude in a negative direction towards point "D" and the carrier frequency is lowered in proportion until when point "D" is reached the carrier has arrived at its negative 100% modulation frequency of (98.1 mc — 75 kc), or 98.025 mc. The amplitude of the sine wave starts back towards the zero axis and the carrier starts back to its center frequency arriving at the time the modulating signal reaches point "E".

It can be seen from the above example that a modulating signal of say 100 cycles and sufficient amplitude to give 100% modulation causes the carrier frequency to deviate 75 kc above and below the center frequency 100 times per second. Now, if the amplitude of the modulating signal is halved, the carrier frequency will still make its complete excursion 100 times per second but will only be caused to deviate (½ of 75 kc), or 37.5 kc above and below its center frequency.

Doubling the frequency of the modulating signal but maintaining the same amplitude as above will cause the same deviation of the carrier but the carrier will swing through this deviation twice as many times per second.

Inasmuch as FM is mainly a system of modulation, it is apparent that the engineer at the transmitter will be more affected by a change from AM to FM than will the studio, maintenance, field, and transmission engineers. How much these latter engineers will be affected depends on the class of broadcasting station in which they are employed. There are AM broadcasting stations in the country where, due to the presence of keen competition, a far sighted policy by the management towards development and improvement and a good source of revenue, the utmost has been done in acoustical design of studios, electrical design of equipment, and practical operating techniques, to obtain the maximum possible fidelity.

The operating personnel at such broadcasting stations will be only slightly affected, if at all, by a change from AM to FM, and these managements will receive the reward for having spent time and money in developing equipment above and beyond what would have been necessary with a 5 kc AM channel width and the minimum requirements imposed by the F.C.C.

Less modern AM stations will find it necessary to improve the acoustical and electrical designs of their studios and equipment, and possibly use more care in their operating techniques. Our discussion of changes in techniques and equipment will be directed primarily to the personnel of the latter type station.

When a studio is acoustically designed for high fidelity pick-ups, the usual criterea for "good acoustics" is considered during its design, whether ultimately the program material is used to amplitude or frequency modulate the transmitter. Good acoustics would includes the following:

A. Sufficient loudness for intelligibility.
B. Freedom from extraneous noise.
C. Absence of echoes, flutter, and dead spots.
D. Separation of successive sound for intelligibility of speech and musical requirements.

By the same token pick-up technique, contrary to certain articles written on the subject, may be identical with that used in regular AM broadcasting. As most everyone who has been engaged in broadcasting studio control room monitoring knows, microphone placement, aside from certain inherent limitations which must be considered, does not lend itself to any set of hard, fast rules but is governed by the individual ear of the person responsible for the quality and balance of the program material. One must allow for the fact that when a ribbon velocity microphone is placed so close to the sound source that it is actuated by the spherical rather than plane waves, distortion or "boominess" results. Also, one must remember that the response of a microphone to the higher audio frequencies is best when the source of those frequencies is directly in front of the microphone and the response decreases as the source is moved to either side

of this point. Otherwise individual taste pretty much determines whether "close" microphone technique with less reverberation is desired or "far" microphone placement with more liveness and brilliance is preferred. In any case, the microphone placement having once been established for desired quality and balance, with monitoring equipment good to 15 kc, whether the material is used to frequency modulate or amplitude modulate the carrier, is of no import.

There is one "human" factor which might be mentioned with regard to care used in making a pick-up for FM transmission. Due to the fact that the system is no longer limited to a 5 kc bandwidth, actors, musicians, announcers, etc., will have to be exceptionally careful regarding extraneous noises of higher frequences, such as key jingling, script rattling, etc.

In the control room the monitoring engineer will be using the same type mixer system and V.U. meter as now used in AM monitoring. The mixer system may be better designed in order to hold down cross talk or hum pick-up and keep the system within the acceptable noise level figure. Also, audio amplifiers and speakers will have a minimum response flat from 50 to 15 kc. The V.U. meter will be used and read the same way but we might note the difference of over-modulation in AM and FM. When we modulate an AM carrier by more than 100% there is an actual interruption of the carrier during negative peaks and distortion of the carrier during positive peaks, assuming the transmitter is being operated at maximum efficiency. When we modulate an FM carrier by more than 100% there is no interruption in carrier output and no possibility of overloading the final stage in the transmitter because the power in the fully modulated carrier is the same as in the unmodulated carrier. However, distortion is still probable with over 100% modulation due to the frequency deviation capability of the transmitter, and FM receiver response dropping off at frequencies outside the 150 kc (±75) band required (by definition) for 100% modulation. Additional distortion may result from adjacent channel spill over, unless safeguards are employed to preclude carrier deviation in excess of 150 kc.

One of the requirements imposed by the F.C.C. is that the electrical noise level in an FM system from the microphone preamplifier through the transmitter shall be 60 db below program level. In an AM station a noise level of 50 db below program level is acceptable.

To meet this extremely low permissable noise level will require much thorough work during the installation of the equipment in order to carefully ground shields, chassis, prevent a-c pick-up due to transformers or a-c lines being unshielded or too close to low level audio circuits, etc. Also, very regular and thorough maintenance work will be required in order to keep the noise down by locating noisy tubes, or other components, poor grounds, etc., which would add to the electrical noise problem. This problem is increased by the F.C.C. requirement that the equipment used throughout the system in an FM station must be capable of handling frequencies from 50 to 15 kc. The wider the equipment response the more noise frequencies get through and the harder it is to meet a specified noise level.

Naturally, the test equipment such as CROs, oscillators, loud speakers and noise check amplifiers used for maintenance and adjustment must have a frequency response at least as good as the required response of the system itself.

At stations where the transmitter is some distance from the studio equipment the noise check will probably be made as in present AM practice. That is, the noise level is measured from the input to the microphone preamplifier through the line amplifier. Then a check is made of the phone line between the studio plant and the transmitter, and finally a check is made from the input to the output of the transmitter.

A more thorough and accurate check would be to measure the noise through the entire system at the same time because the noise measured on each section of the system may be additive and result in more than the allowable noise figure.

One method for checking the overall noise of the system is to feed an audio oscillator at about 1000 cycles and microphone level (approximately —55 db for a 44-BX) into the preamplifier, set the level at the mixer to give normal level (generally about +8db) into the phone line and set the transmitter amplifier for correct level to give 100% modulation (±75 kc). A special radio monitor is coupled to the antenna transmission line in order to detect the transmitted signal. This monitor merely consists of a detector (discriminator) and a low gain audio stage. Hence, negligible noise is introduced by the monitor itself. The output of the monitor is fed to a noise and distortion meter which gives a reading in db for the 1000 cycle tone being used for modulation.

Next the oscillator is removed from the pre-amp input and the pre-amp input is terminated in its characteristic impedance. The reading now given by the noise and distortion meter is due to noise alone and the difference between the two readings gives the number of db the noise is below program level.

Transcriptions are at present the major source of program and for some stations they are the total source of program material. There are transcriptions on the market in regular use at AM as well as FM stations with a response stated to be flat to 12 kc. As a matter of fact, at least one manufacturer claims to be turning out transcriptions with a response flat to 15 kc. Again competition and a general desire for research and improvement has induced several of the transcription companies to spend much time and money in attempting to produce the best possible in high fidelity, low noise-level records. The chief obstacle has been the design and manufacture of cutting and reproducing heads which will faithfully translate intelligence up to 15 kc.

The wide frequency band, low noise level recordings mentioned above are surfaced with vinyl compounds which allows for the least possible surface noise.

Commercial records designed for home use are generally of the shellac variety which results in relatively high surface noise and they are seldom intended to reproduce frequencies above 5 kc. These commercial records are also used in AM broadcasting work, usually with a filter to attenuate frequencies over approximately 5 kc, and thereby eliminate some of the surface noise.

The F.C.C. "Standards of Good Engineering Practice" specifies what the frequency response of the broadcasting equipment should be, but they do not specify that this frequency range must be utilized. Therefore, an FM station whose equipment meets all the specifications required, may still use commercial records whose frequency range is limited to one-third of what the transmitting equipment can handle.

Depending on the policy of the station, a filter may be used to knock down the higher frequencies of the record and thus cut down surface noise, or, the filter may be eliminated as is the practice with some FM stations at present, and the choice left up to the individual listener to adjust his tone control to eliminate scratch or accept it in order to hear a greater frequency range.

Similarly the "Standards" do not make any specifications concerning the quality of pick-up and radio lines associated with a "nemo" or remote pick-up program. Hence, a remote pickup could be handled identically as in present AM practice including equalizing the radio lines from the remote pick-up point only out to 6 or 8 kc and put on the air by an FM station without violating any of the F.C.C. regulations.

At the present time, therefore, the quality of the program received by the FM listeners depends to a large extent on the integrity of the individual station management and its desire to offer its listeners material whose quality is commensurate with the capabilities of the station equipment.

The F.C.C. specifications for phone lines used between studio and transmitter are that the lines be flat within 2 db of the 1000 cycle level from 50 to 15000 cycles and that the noise be 65 db below program level (+8 db).

Phone companies may make use of either open wire lines, non-loaded cable or carrier loaded cable, depending on the particular installation and the length of line required. Non-loaded cable (no inductive compensation for cable capacity) will probably be used mainly for feeds between the studios and transmitter where the length of line required is not very great. For greater distances, such as city-to-city feeds, when FM is in the network catagory, carrier loaded cable (small inductance every 90 feet to compensate for capacity) will be used. This is the cable that is presently used for multiple telephone transmissions, and is good out to 100 kc.

It has been found that a 10 db line (level down 10 db at 1000 cycles after equalization) can be equalized up to 15 kc and still be within the noise level tolerance. Any lines over 10 db must have one or more amplifiers associated with them in order to transmit frequencies out to 15 kc and still have the noise 65 db below program level. If the length of run requires only one repeater amplifier it may be A-C operated, but when more than one amplifier is required it has been found that D-C operated amplifiers must be used in order to stay within the specified noise limits.

Except for the fact that the phone lines used for FM transmission should be equalized out to 15 kc, the procedure for equalizing the lines is identical with that used at AM stations. Most of the equalizers employed at the latter stations are so designed that they are capable of equalizing only out to about 10 kc (level at 10 kc within 2 db of level at 1 kc). However, wide band equalizers are available which will cover the full 15 kc range necessary for FM work.

It has been the purpose of this paper to show the presently employed AM broadcast engineers that there is no practical or essential difference in operation of AM or FM for the studio, field, maintenance, transmission, and master control engineers.

These engineers will continue to function as with AM; the riding of program levels continues as with AM, the same VU meter is used, and peaks in excess of 100 will continue to be discouraged the same as in AM. In either system of modulation (AM or FM), level peaks in excess of 100 on the VU meter result in ultimate distortion to the listener—even though the mechanics involved in the production of the distortion are quite different, as we have pointed out above.

In another article, we will point out some of the effects of FM as they will affect the presently employed AM transmitter engineer and what he will have to do and cope with in the face of this technological advance that is called FM.

Left to right: George Haefner, announcer; Ray Lucia, Ass't Chief Engineer; Ken Gardner; Charlie Snyder, control engineer and also President of the local NABET Chapter; Curly Green, control engineer; and Dean Harris, Chief Announcer.

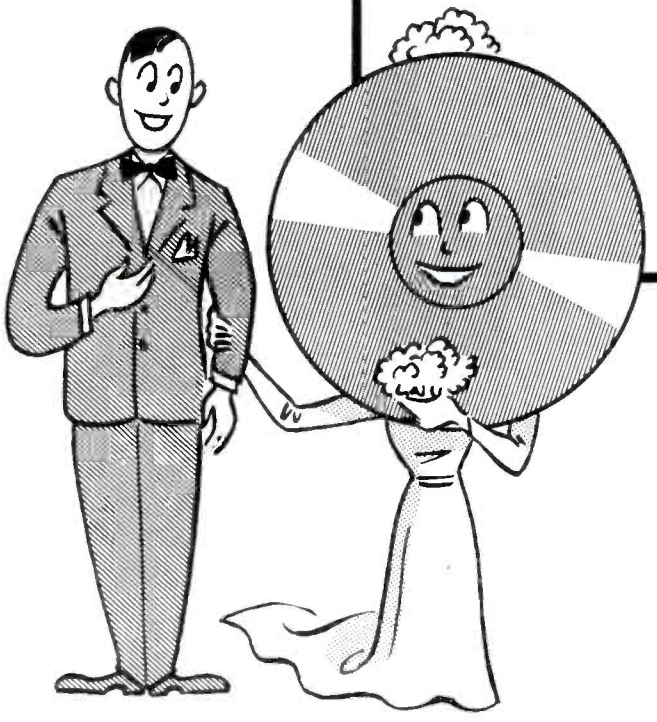
Ken Gardner Celebrates 20 Years With WHAM

By George W. Wilson

Ken Gardner, Chief Engineer of WHAM, just recently celebrated 20 years with Station WHAM, Rochester, New York. At a party at which 50 members of the staff of WHAM were present, Ken received a plaque with the signatures of all the men of the staff, both technical and administrative. He also received a General Electric clock from his technical staff that is fitted for automatic turn-on and off.

Ken joined the staff of WHAM in 1927 when things were on a very much smaller scale. At the present Ken's chief concern is WHAM's new Radio Center that is now under construction. Mr. William A. Fay, vice-president of Stromberg-Carlson Co., owners of WHAM, and General Manager of WHAM who was present at the party wished Ken the very best of luck and hoped that the relationship between he and the station would last a long, long time.

"Marriages"



Every Advance Recording Blank has the qualities of clarity, smoothness and longevity demanded by meticulous studio engineers. That's why more and more "marriages" are being arranged every day between Advance Recording Blanks and Engineers in leading broadcast and recording studios throughout the nation.

Advance
Recording Products Company

36-12 34th STREET · STillwell 4-7837 · LONG ISLAND CITY, N. Y.

Latest RCA Television Transmitter

By Ed Stolzenberger

HEART of the new RCA television transmitter is the unique, new power tube, the RCA 8D21, which is used both in the aural and visual section of the TT-5A transmitter.

Technical advantages provided by the dual-tetrode construction of this tube are: (1) inherent stability, achieved by built-in neutralization, a radical departure from other types of high frequency tubes with which neutralization is a painstaking process; (2) wide band width at high efficiency, achieved by low output capacity, and (3) minimum current loss to grids and shields, accomplished by electron optics.

The tube is designed in such a way that the screen grid is by-passed to the cathode within the tube, and the small feed through capacitance is essentially reduced to zero by means of small neutralizing tabs within the tube. Television engineers who have spent many hours trying to neutralize high frequency transmitters using conventional tubes, can quickly appreciate the stability of operation achieved with the use of the RCA 8D21.

Circuit tuning in the TT-5A is reduced to an absolute minimum. By the use of efficient high level modulation, only one stage of broadband r-f has to be tuned, and that is the power amplifier output circuit of the picture transmitter. The use of only one broadband stage eliminates tuning difficulties which are encountered when several broadband stages are cascaded. All the low power stages are tuned in the conventional manner.

The two transmitter units, visual and aural, are almost identical. The primary difference is the type and method of modulating the two transmitters. The FM sound transmitter employs a standard RCA FM exciter at the head of an r-f chain, while the picture r-f chain begins with a conventional crystal oscillator.

The r-f stages following the crystal oscillator in the picture transmitter and the FM exciter in the sound transmitter are identical. The first three subsequent stages are mounted as a unit. This is called the low frequency driver. In channels 7-13 two additional r-f stages are used following this driver. Otherwise, there is no difference between the transmitter when operating on a high or low frequency channel.

All driver stages employ narrow band circuits and are operated class C with the characteristic high efficiency. This arrangement of circuits is easy to adjust, and follows the trend of recent years toward high level modulation.

Both the picture and sound sections of the transmitter are operated from power supplies which are entirely isolated from each other. By such a system, it is possible to operate either section of the transmitter independently of the other during test periods, with a resultant saving in overall power consumption. All the power transformers are of the air cooled, dry type and are mounted within the transmitter cabinet.

The video section employs three electronically regulated power supplies. These low impedance sources provide constant voltage to those circuits whose current demand is affected by varying picture background intensity and which otherwise might oscillate, as a result of low frequency changes in plate current.

The control system of the transmitter closely resembles the type utilized in the most recent design of broadcast transmitters. All units are interconnected and are so arranged that either manual or fully automatic starting may be employed.

All circuits are adequately protected against overload, and a new system of water interlocks are employed for protecting the two RCA 8D21 power amplifier tubes. Recycling overload circuits automatically reapply transmitter power three times and then remove all plate power in the event that an overload does not clear. The transmitter will instantly return to the air following complete power failures up to four seconds duration without waiting for the usual plate time delay relays to recycle. The electrical circuits are so planned that the operator may do emergency maintenance or servicing work on one section of the transmitter while the other is on the air, even replacing the 8D21 power tube, without shutting down the water circulation. The operator is fully protected by proper interlocking and safety devices.

Dual unit "reflectometers" are built into both the sound and the picture output circuits. These units are an invaluable aid in checking and maintaining proper output characteristics. The reflectometers perform three main functions (1) indication of the power output of the transmitters. (2) Measurement of the standing wave ratio on the transmission line. (3) Operation as an r-f over-load cutout, instantly removing plate power, protecting the transmission line against damage from power arc resulting from lightning follow through, in the event of a lightning stroke.

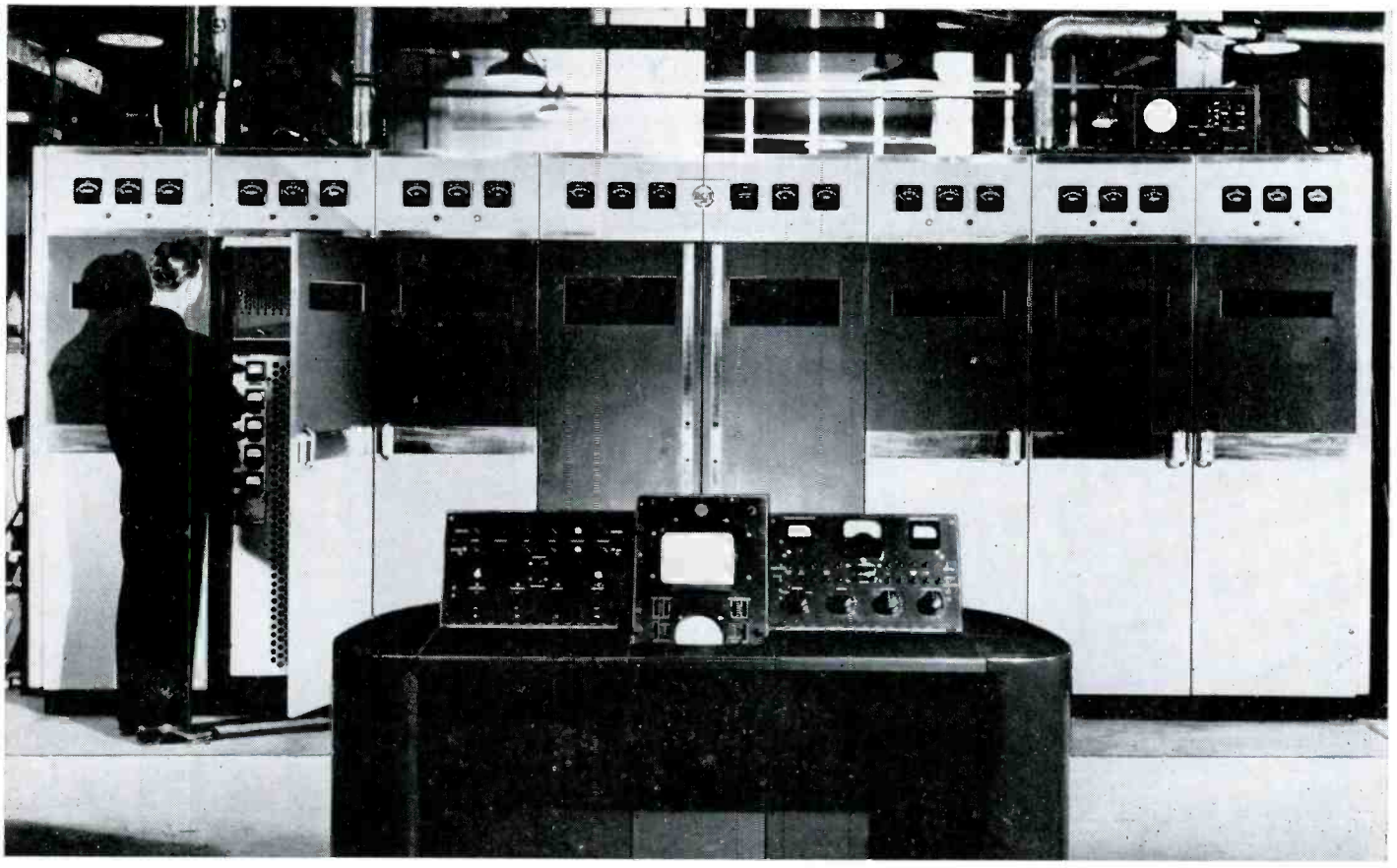
All the transmitter controls are centralized in one cabinet which houses the entire control system. Auxiliary control switches on the console and near the power amplifier stages provide a maximum of operating convenience.

The console is an especially designed unit combining control and monitoring functions for both the sound and picture portions of the transmitter. It contains the essential control switches, indicator lamps, and power output meters for transmitter operations, plus complete facilities for monitoring sound levels and picture quality.

Picture monitoring is accomplished by units incorporated into the console which are identical to the studio master monitor. This latter unit contains a ten inch kinescope for checking picture reproduction, and a five inch cathode-ray oscilloscope for monitoring wave form quality.

The vestigial side-band filter effectively eliminates the lower sidebands and makes compliance with the FCC regulations positive, by methods independent of operating adjustments. It is constructed of low loss coaxial transmission lines and is complete assembled and adjusted at the factory for a given assigned channel.

Supplementing the features of the RCA TT-5A transmitter, the RCA Super-Turnstile antenna couples extreme broadband performance with inherent suitability for diplex operation, making it ideal for television. Diplexing, which combines the signals from the sound and picture sections of the transmitter and permits simultaneous transmission of both signals from a single radiating antenna, actually pro-



This is RCA's new postwar 5-kilowatt television transmitter, Type TT-5A, which provides for satisfactory operation on all 12 television channels allocated to commercial metropolitan television by the Federal Communications Commission. The new transmitter combines all the necessary components for transmitting both television pictures and FM sound. The TT-5A was especially designed to operate with a newly developed high frequency power tube, the RCA 8D21. The transmitter measures 17 feet by 3 feet by 7 feet. Shown in the foreground is the control console which is used to monitor the picture quality and sound level of the television program going out on the air.

vides twice the antenna gain obtained with a separate antenna of a given vertical dimension.

Because of the broad-band properties of the Super-Turnstile antenna, only three antennas of this type (54-66 megacycles, 66-88 megacycles, and 174-216 megacycles) are needed to cover the twelve metropolitan television channels. Antenna gains of 3.8 to 9.3, depending on the channel, are obtained.

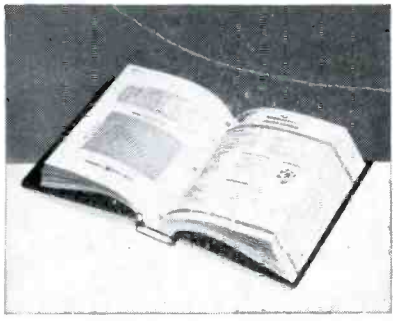
The radiators of this antenna are solidly clamped to the supporting pole without intervening insulating material, giving it ample mechanical ruggedness. The shape of the radiators is such, that it blends with the architectural lines of tall buildings on which the antenna may be mounted.

An additional advantage of the Super-Turnstile is the opportunity it affords for triplex operation. For this purpose, a triplexing unit located in the transmitter building introduces an independent FM carrier in addition to television picture sight and sound signals. The triplexer enables the same antenna to radiate a television program along with a separate FM program simultaneously with absolutely no interference from either. This arrangement minimizes the tower load and also reduces the cost of construction.

Installation of the antenna and associated equipment is simplified by the fact that all of the frequency-selective elements of the system, including the side band filter, the diplexer, and the triplexer are package units, assembled and adjusted for a station operating frequency at the RCA factory.

Trade News

* G.E. announces a $5., 700 page technical tube manual on receiving tubes;



bound in stiff cover with expander-binder. A dollar a year will keep the manual up-to-date. May be ordered from G.E. Electronics Dep't, Tube Div. Bldg. 257, Schenectady 5, N. Y.

* RCA announced its first post-war console television receiver, which combines television, FM, standard broadcast, international short-wave, and phonograph. Suggested retail price $795. exclusive of tax and Owner's Policy fee, tentatively set at $79., and includes installation, maintenance, and replacement of all parts for one year. Known as Model 641TV, the television receiver includes automatic brightness control, and uses a 10-inch picture tube.

(Continued on Page Twenty-four)

The 1947 Winter I. R. E. Meeting

Summaries of Technical Papers — Continued From Last Issue

By Ed Stolzenberger

No papers are available in preprint or reprint form nor is there any assurance that any of them will be published in the "proceedings of the I.R.E.," although it is hoped that many of them will appear in the subsequent issues.

TELEVISION B

Chairman, E. W. ENGSTROM
(RCA Laboratories Division, Radio Corporation of America, Princeton, N. J.)

41. Cathode-Ray Tubes and Optical Systems.

H. Rinia, J. DeGier, and P. M. Van Alphen
(N. V. Philips' Gloeilampenfabrieken, Eindhoven, Holland.)

A compact projection system utilizing a small cathode-ray tube, and modified Schmidt optics is described. A small tube neck permits efficient focusing and reflection with high accelerating potential. A 12x16-inch picture is obtained by a linear magnification of 8.5. A simple process for producing the correction plate is described.

42. High-Voltage Unit and Deflection Circuit.

J. Haantjes, G. J. Siezen and F. Kerkhof
(N. V. Philips' Gloeilampenfabrieken, Eindhoven, Holland.)

A voltage-tripling interruption-type high-voltage unit utilizing feedback for stabilization is described. Newly developed magnetic material improved the efficiency and reduced the transformer size. All high-voltage components are sealed in an insulating medium. Some circuit developments adaptable to direct viewing or projection television are also described.

43. Cathode-Ray Flying-Spot Scanner for Television Signal Generation.

R. D. Kell and G. C. Sziklai
(RCA Laboratories Division, Radio Corporation of America, Princeton, New Jersey.)

One of the primary requirements in television development is a standard high-quality video signal source on which one may rely for good resolution. high signal-to-noise ratio. freedom from spurious signals, etc. While a monoscope signal fulfills this requirement, it provides only one picture. The use of a high-voltage kinescope with a short-persistence phosphor and multiplier photocells permits the construction of a flying-spot slide projector providing an excellent video signal from a wide variety of subjects.

44. Gas-Discharge-Tube Television Deflection Systems.

K. R. Wendt
(RCA Laboratories Division, Radio Corporation of America, Princeton, New Jersey.)

A new horizontal-deflection power-output system is described which uses thyratron tubes. The principle of operation, which is quite different from that used heretofore, is described, and the new and old systems compared. The thyratron system obtains its power from the 300-volt supply at a reduced current drain. It supplies a direct-current power as an output at a low voltage and high current which may be used elsewhere in the receiver.

45. An Improved Counter-Timer for Television.

C. E. Hallmark
(Farnsworth Television and Radio Corporation, Fort Wayne, Indiana.)

A master timer employing two cascaded counter circuits accomplishing the usual 525-to-1 frequency division is described. It is shown that, due to the use of an improved linear counter, the higher count-down ratio does not result in any decrease in stability. The linear counter is described in detail. It is shown that, for a given stability, the count-down ratio of this type counter may be extended indefinitely, subject only to practical engineering limitations.

ELECTRONIC DIGITAL COMPUTERS

Chairman, H. DIAMOND
(National Bureau of Standards, Washington, D. C.)

46. The Electronic Digital Computer.

J. W. Forrester
(Massachusetts Institute of Technology, Cambridge, Massachusetts.)

A discussion of the nature of electronic digital computers, with mention of early attempts and existing systems. A general block diagram of a computer of the modern proposed types, and an outline of fundamental computer operations of input, arithmetic, storage, and output will be given as a basis for following papers.

47. Input Mechanisms for Electronic Digital Computers.

S. N. Alexander
(National Bureau of Standards, Washington, D. C.)

Criteria for acceptable input mechanisms are established and suggestions for standardization of systems presented. The application of commercially available equipment such as teletype to the problem is discussed. Recently developed input systems and special materials used therein are described.

48. Electronic Computing.

H. H. Goldstine
(The Institute for Advanced Study, Princeton, New Jersey.)

The speaker will show how arithmetical operations and the switching of numbers and control of computation can be realized by means of vacuum-tube circuits. The interrelation between the engineer and mathematician in the development of computing instruments will also be discussed briefly.

49. The Selectron—A Tube for Selective Electrostatic Storage.

J. A. Rajchman
(RCA Laboratories Division, Radio Corporation of America, Princeton, New Jersey.)

The selectron, conceived primarily for the inner memory of a digital electronic computer, is a tube for storing several thousand on-off signals. Electrons from an extended source are intercepted by two orthogonal sets of spaced parallel conductors creating a checkerboard of windows, internally connected in such combinations that, by applying on-off voltages to a relatively small number of sealed-in leads, the flow of electrons can be controlled through individual windows.

50. Applications of Electronic Digital Computers.

P. Crawford
(Special Devices Division, Office of Naval Research, Washington, D. C.)

A discussion of computer applications, including scientific calculations, wave propagation, and aerodynamics. Comments will be made on the future relation of analogue and digital computers, and also on the possible engineering application of electronic digital computers to automatic process and factory control, air traffic control, and business calculations.

POWER OUTPUT VACUUM TUBES

Chairman, L. MALTER
(Naval Research Laboratory, Washington, D. C.)

51. Screen-Grid Transmitting Amplifier Tubes for Operation Up To 500 Megacycles.

W. G. Wagener
(Eitel-McCullough, Inc., San Bruno, California.)

Some of the limitations in tube and circuit

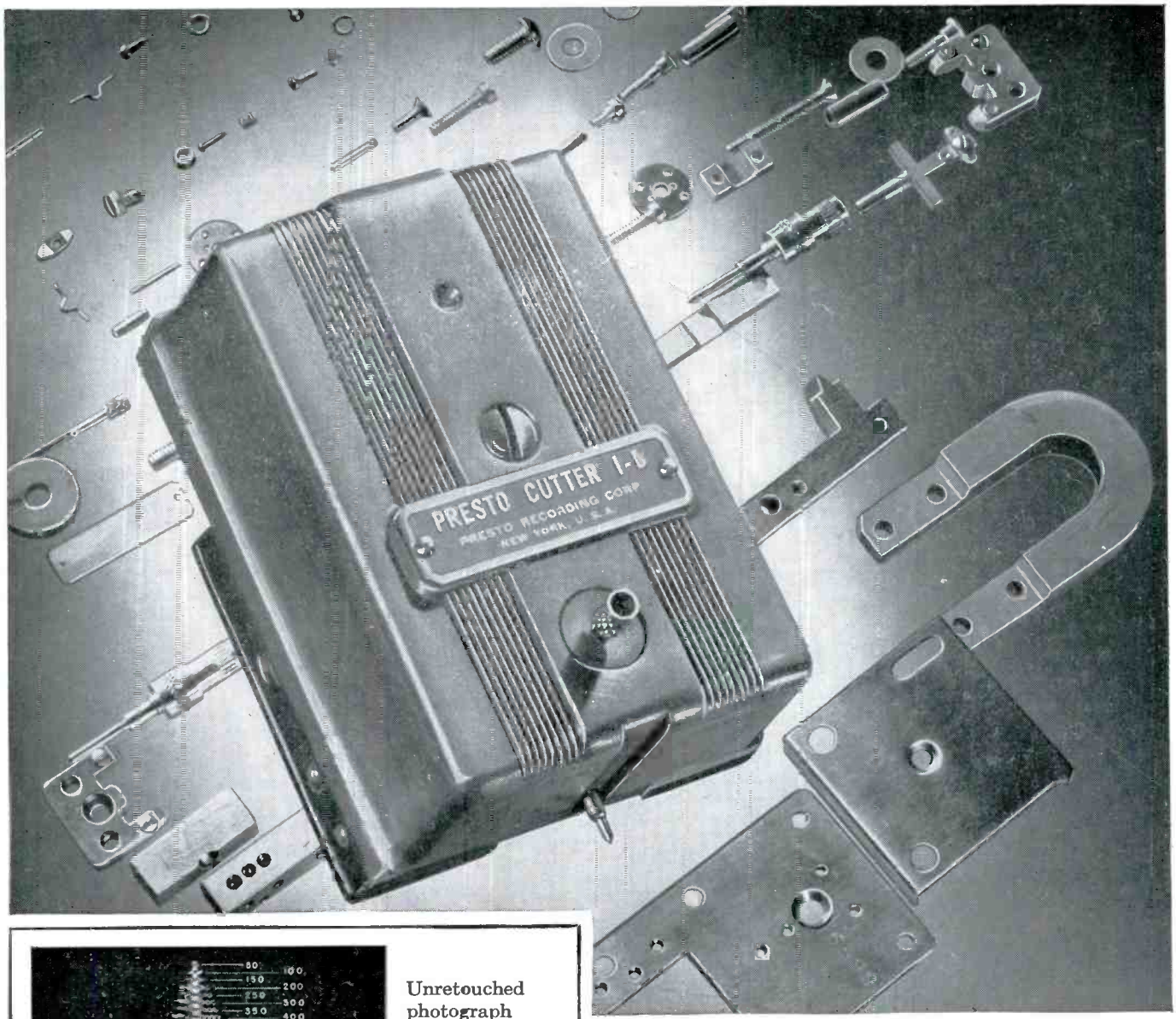
(Continued on Page Fourteen)

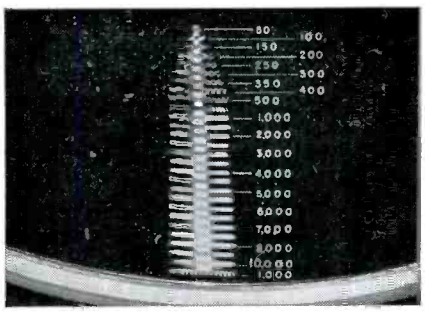
NOW! a new standard of performance in cutting heads

THE PRESTO 1-D

▶ The new Presto 1-D Cutting Head offers: *wide range, low distortion, high sensitivity* and *stability through a temperature range of 60°-95° F.* The Presto 1-D Cutting Head is a precision instrument made entirely of precisely machined parts, expertly assembled and carefully calibrated. These factors, plus its sound basic engineering design, produce a cutter unequaled in performance by any other mechanically damped magnetic device.

▶ Note from the light pattern below: The correct location of the cross-over point at 500 cycles, the 6 db per octave slope below this point, and flat response above 500 cycles, which is free from resonant peaks. The range of the cutter is 50-10,000 cycles. The Presto 1-D is damped with "Prestoflex" which is impervious to temperature changes between 60 and 95 degrees Fahrenheit.





Unretouched photograph showing the light pattern. Notice correct location of the cross-over point at 500 cycles.

PRESTO
RECORDING CORPORATION
242 WEST 55TH STREET, NEW YORK 19, N. Y.
Walter P. Downs, Ltd., in Canada

WORLD'S LARGEST MANUFACTURER OF INSTANTANEOUS SOUND RECORDING EQUIPMENT & DISCS

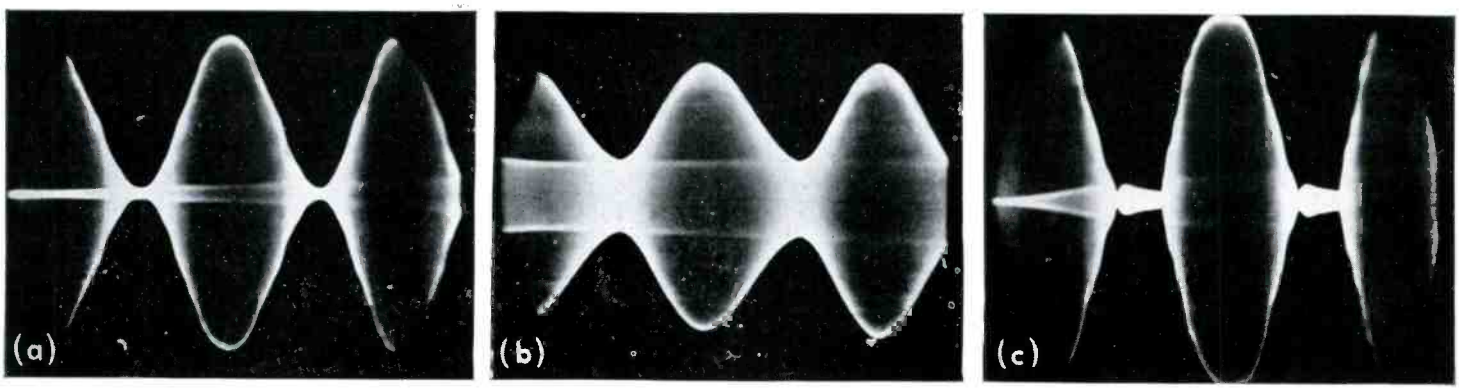


Figure 1—Oscillograms (a) and (b) show current and voltage envelopes, respectively, at point in transmission line or output circuit where impedance at sideband frequencies is lower than at carrier frequency, as in Figure 3. Modulation frequency is 7500 cycles.

Notes on Modulation of AM Transmitters

Laboratory Tests Show Effect of Sharply Tuned Antennas on Observed Modulation Waveform at High Audio Frequencies

Reprinted by permission from the Western Electric *Oscillator*

By W. H. Doherty

Bell Telephone Laboratories

WITH directional antenna arrays in AM broadcasting the commonpoint impedance of the antenna system sometimes departs considerably at sideband frequencies from its mid-band or carrier-frequency value. The more remote side frequencies, at which the departure is greatest, correspond to the highest modulating frequencies. Practically, the effect of the impedance variations shows up only as an attenuation of these high frequencies, since the transmitter is modulated so lightly at high audio frequencies in actual program transmission that nonlinear distortion resulting from improper load impedance is negligible.

It is quite common practice, however, to modulate heavily with a test oscillator from time to time in measuring distortion over the audible frequency range. An interesting experiment carried out recently by the Bell Telephone Laboratories at Whippany, N. J., brings to light some important precautions to be taken if these measurements are to have any significance in cases where the impedance of the load or antenna is not essentially constant over the transmitted band.

The commonpoint impedance of the antenna array, or the impedance at the input terminals of the transmission line, may deviate from the ideal flat characteristic in various ways. For instance, in some cases the impedance looking into the line is lower at sideband frequencies than at the carrier frequency, while in other cases it is higher, or it may be higher on one side and lower on the other. Taking the particular case where the impedance of the line is a maximum at the carrier frequency and is lower for both sidebands, if the audio level into the transmitter is adjusted for 100 per cent modulation of the current fed into the line, then the voltage across the line will exhibit a lower percentage of modulation. That is, while each of the two side frequency *currents* is 50 per cent of the carrier current, the two corresponding side frequency *voltages* are not 50 per cent of the carrier voltage.

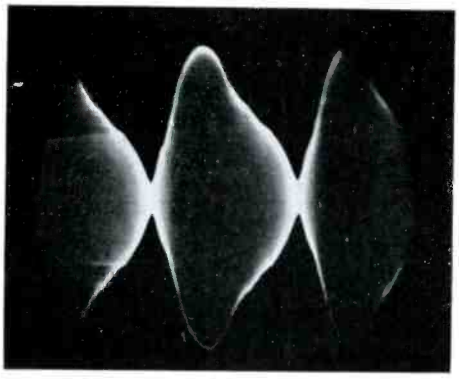
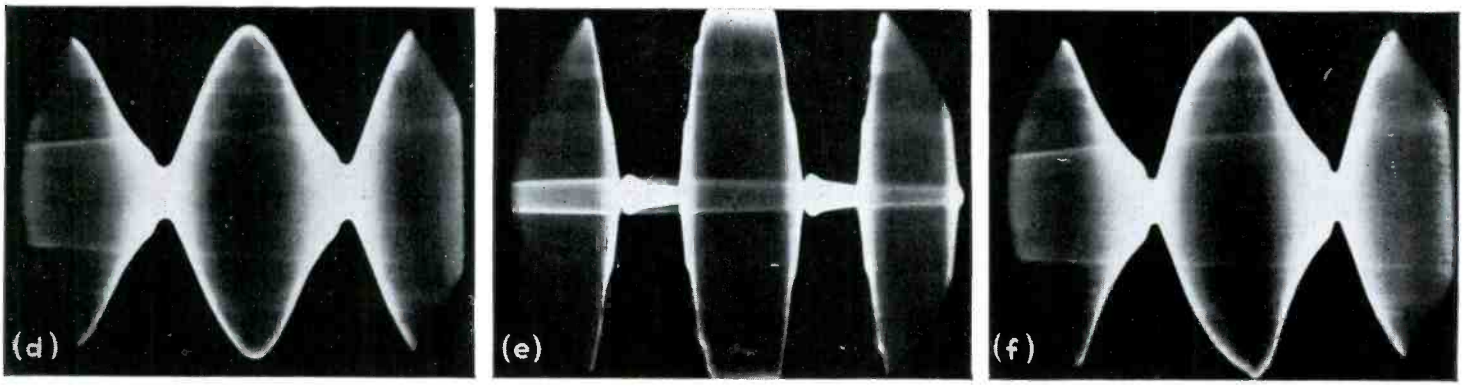


Figure 2—This distorted wave contains no extraneous side frequencies but is simply the result of dissymmetry in amplitudes and phases of voltages at desired side frequencies at point of observation.

Tests Depicted in Oscillograms

A test under these conditions resulted in the oscillograms of Figure 1, above, where (a) and (b) are the envelopes of the current and voltage, respectively. Accordingly, if the voltage wave (b) rather than the current wave is being observed, the observer will not know that the current is 100 per cent modulated and will crank up the audio input in an endeavor to modulate more fully. Oscillograms (c) and (d) show the resulting current and voltage waves after a 3 db increase in audio input. The positive current peaks on picture (c) are seen to rise satisfactorily, but on the negative swing the current wave necessarily flattens at the zero axis because the tubes cannot deliver reverse currents. As a result the voltage wave seen in (d) inevitably shows severe distortion and cannot be made to appear fully modulated no matter how much the audio input level is increased. Oscillograms (e) and (f) represent another 3 db increase (200 per cent modulation).

These oscillograms were taken with



If observer is looking at voltage wave (b) and does not know that current wave (a) is 100 per cent modulated, he will increase audio input, causing overmodulation of current wave and, inevitably, distortion of voltage wave. Oscillograms (c) and (d) are current and voltage, respectively, for 3 db, and (e) and (f) for 6 db overmodulation.

a modulation frequency of 7500 cycles. A standard Western Electric 443A-1 (1 kilowatt) transmitter was used as a power source, but the results would be the same with any other source of low-distortion modulated rf. A simulated load was employed having the impedance-frequency characteristic shown in Figure 3. The impedance at frequencies 7500 cycles on each side of the carrier frequency is seen to be only 60 per cent of the impedance at the carrier. This is why the voltage is only about 60 per cent modulated when the current is fully modulated.

Now it is well known to those familiar with transmission lines that when the impedance measured at some point in the line differs from the surge impedance, then at various other points in the line the impedance will be found to be quite different again. Therefore the side frequency impedances given by Figure 3 for one point in the line will be different at other points. For instance, at a point removed a quarter wavelength from the point corresponding to Figure 3, the impedance-frequency relations would be as shown in Figure 4. Here we find the impedance *higher* for the side frequencies than for the carrier; higher, in fact, by the same ratio by which it was lower in Figure 3. Consequently, if one were to observe the modulation envelope at this new point he would find the current envelope only 60 per cent modulated when the voltage envelope is 100 per cent modulated, exactly the reverse of Figure 1(a) and (b).

A more striking case occurs at a point an eighth wavelength removed from the original point of measurement. Here the impedance-frequency curve

(Continued on Page Fourteen)

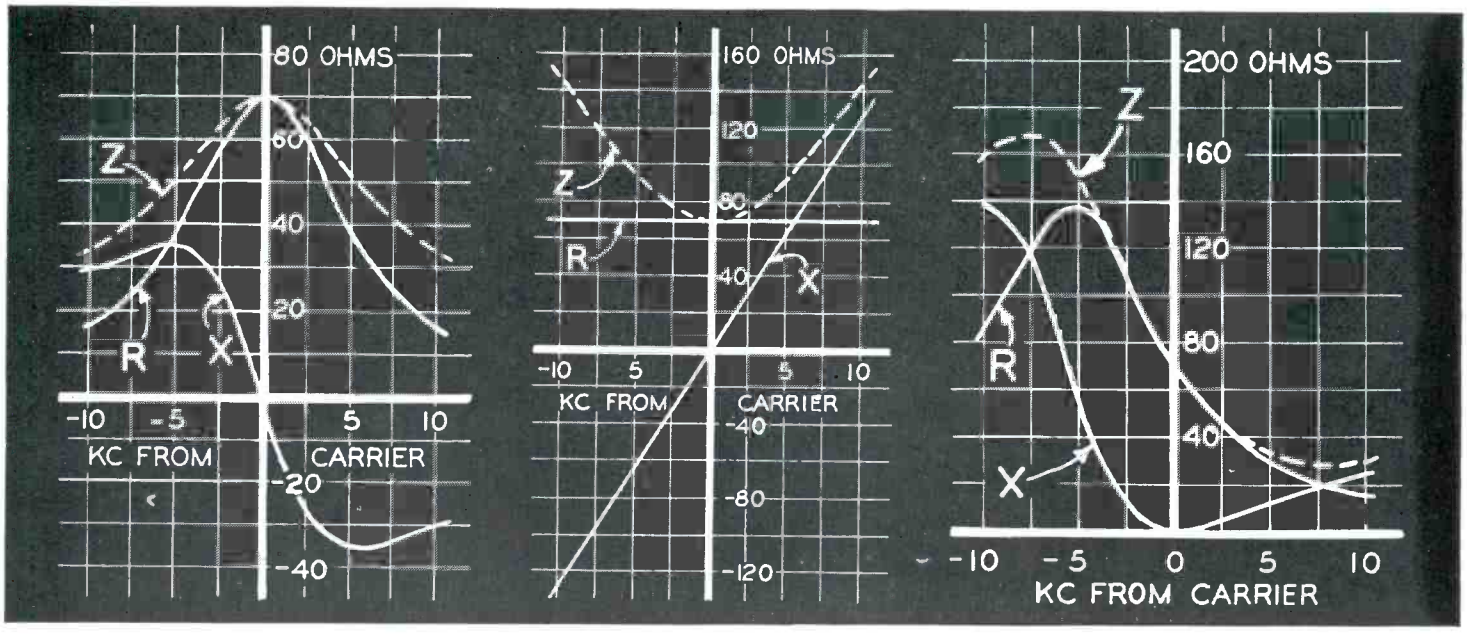


Figure 3—When the impedance of the transmission line at sideband frequencies is lower than the impedance for the carrier frequency as shown on the curves above, the current wave will be fully modulated when the voltage wave is not, as is indicated in the oscillograms (a) and (b) of Figure 1.

Figure 4—At a point in the line a quarter wavelength removed from the original point, the impedance-frequency curves are markedly different. Here the impedance is higher for the sidebands than for the carrier, so that the voltage wave will be fully modulated when the current wave is not.

Figure 5—At point in line an eighth wavelength from original point, impedance is higher for one sideband than for carrier, and lower for the other. Result is unequal side frequency amplitudes and unsymmetrical phase relations, with a consequent distorted envelope as shown in Figure 2.

I.R.E. Papers

(Continued from Page Ten)

design in the very-high- and ultra-high-frequency regions are reviewed, and the expedients necessary to correct these limitations are presented for the case of screen-grid beam-power amplifier tubes.

The design considerations are illustrated by reference to new transmitting tetrodes, not as yet generally available, but which include tubes capable of stable high-gain amplifier service in conventional circuits as high as 500 megacycles.

52. A New Frequency-Modulation and Television Power Amplifier Tube and Its Associated Grounded Grid Cavity Circuit.

H. D. Wells and R. I. Reed

(General Electric Company, Schenectady, New York.)

A new tube design and an associated grounded-grid cavity circuit are described which are suitable for frequency-modulation and television power amplifiers. The tube is a water-cooled triode of ring-seal construction especially adapted for grounded-grid operation. In frequency-modulation use at 108 megacycles, a pair of these tubes will deliver more than 10 kilowatts of power.

53. A. Frequency Modulation and Control By Electron Beams.

L. P. Smith and C. Shulman

(RCA Laboratories Division, Radio Corporation of America, Princeton, New Jersey.)

B. A Frequency-Modulated Magnetron for Super-High Frequencies.

G. R. Kilgore, C. Shulman, and J. Kurshan

(RCA Laboratories Division, Radio Corporation of America, Princeton, New Jersey.)

C. A One-Kilowatt Frequency-Modulated Magnetron for 900 Megacycles.

J. S. Donal, Jr., R. R. Bush, C. L. Cuccia, and H. R. Hegbar

(RCA Laboratories Division, Radio Corporation of America, Princeton, New Jersey.)

General formulas for the effect of electron beams on resonant systems in terms of frequency shift and change in Q are derived from the point of view of lumped circuits and from a general electromagnetic field standpoint. It has been experimentally found that the use of controlled electron beams for changing frequency is ideally suited for frequency modulation or automatic frequency stabilization of continuous-wave multicavity magnetrons.

Designs of 25-watt, 400-megacycle, and of 1 kilowatt, 900-megacycle continuous-wave multicavity magnetrons are described in which this principle is incorporated.

54. New Techniques in Glass-to-Metal Sealing.

J. A. Pask

(Westinghouse Electric Corporation, Bloomfield, New Jersey.)

A power-glass method of making glass-to-metal seals has been developed. The technique consists of grinding the glass, suspending it in a suitable agent, applying this to the metal, which is prepared for glassing under controlled conditions, and fusing the powder. The sealing process then becomes similar to a glass-to-glass seal without danger of over-oxidation of the metal.

55. Determination of the Mutual Heating of Helical Filaments.

M. Youdin

(Amperex Electronic Corporation, Brooklyn, New York.)

Design charts for straight or hairpin-shaped filaments are available. However, these charts cannot be used directly for the design of helical filaments unless the mutual or self-heating of the helix can first be evaluated. In this paper the mutual heating of a given helical coil is evaluated as a fraction of the power required to operate an equivalent straight length of filament wire at the same temperature.

CIRCUIT THEORY

Chairman, H. A. WHEELER
(Consulting Radio Physicist, Great Neck, L. I., N. Y.)

56. Phase and Amplitude Distortion in Linear Networks.

M. J. Di Toro

(Microwave Research Institute, Polytechnic Institute of Brooklyn, Brooklyn New York.)

In linear phase networks with finite amplitude bandwidth, the step-response build-up time is inversely proportional to the amplitude bandwidth. In all-pass networks with phase distortion, the step-response build-up time is finite because of finite phase bandwith. Certain relations between phase and amplitude bandwidths are shown necessary to avoid transient-response overshoot arising from excessive phase distortion.

57. Correlation of Network Frequency Response and Square-Wave Shape.

R. Lee

(Westinghouse Electric Corporation, Baltimore, Maryland.)

Square waves usually suffer some degradation of the wave shape in passing through a network. This degradation may be evaluated either by square-wave analysis or in terms of the network frequency response, provided due allowance is made for phase shift. This paper gives the wave shape output of commonly used networks when the frequency response is known.

58. Compensation of Phase Shift at Low Frequencies.

F. McGee

(Federal Telecommunication Laboratories, Inc., New York, N. Y.)

A mathematical analysis of low-frequency phase shift in a resistance-coupled amplifier is presented. Some approximate formulas suitable for design work are developed. These formulas are simpler than previously published formulas and more accurate than graphs representing the existing formulas. A new method of compensation, which allows for simultaneous compensation of cathode, screen, and coupling phase shifts, is described.

59. Parabolic Loci of Coupled Circuits.

S. H. Chang

(Waston Laboratories, Cambridge Field Station, Cambridge, Massachusetts.)

It is pointed out that the reciprocal of the system gain function E_1, or its equivalent, of two-mesh tuned coupled circuits when plotted in E_2 complex plane leads to parabolic-loci under certain restrictions. The simple geometric properties of parabolas will facilitate the design work and may throw new lights as to the applications and limitations of the coupled circuits in different fields, electrical or nonelectrical.

60. Reciprocity Failure in Crystal Networks.

L. Apker, E. Taft, and J. Dickey

(General Electric Company, Schenectady, New York.)

From the theory of nonlinear circuits, the loss of a converter network depends on the direction of propagation of power through it. This effect, termed reciprocity failure, has been measured by double-heterodyne methods. The results agree with those predicted from measured crystal constants. Crystals with large nonlinear capacitance have been measured by a new method and have shown failure of both signs.

Modulation

(Continued from Page Thirteen)

is as shown in Figure 5, and because of the dissymmetry with respect to the mid-band impedance, the two side frequency voltages now are unequal in amplitude and shifted unsymmetrically in phase. As a result they combine with the carrier to produce the distorted voltage envelope shown in Figure 2, even though the envelopes at our other two points of observation are symmetrical and relatively undistorted.

While a monitoring rectifier and distortion measuring instrument would register a high percentage of distortion for the envelope of Figure 2, it is clear that this does *not* mean the radiation of extraneous side frequencies. Only the desired side frequencies are present, and the envelope distortion is entirely due to the phase and amplitude changes which they undergo at different points in the line. Similar phase and amplitude changes are undergone at points in the output or "tank" circuits of the transmitter or in the im-

pedance matching or harmonic suppression circuits ahead of the transmission line, and the same kind of envelope distortion would be observed at such points.

Degree of Modulation Affected

It is fortunate that these test conditions are not met with in transmission of speech and music. When the amplitudes of the two side frequencies associated with the modulating tone are small, the envelope shape will be sinusoidal regardless of shifts in their relative sizes or phases. The *degree* of modulation, however, can be profoundly affected, and, like the carrier amplitude itself, will be different in different directions of the radiated pattern, so that the final demodulated signal will show a frequency response varying somewhat at different receiver locations.

This rather fundamental experiment indicates that in modulating a transmitter heavily at a high audio frequency one should be careful, if the load is frequency-sensitive, to choose a suitable monitoring point. The type of transmitter employed is immaterial on this score. If the current wave is to be observed, the point of observation for determining 100 per cent modulation should be one where the resistance and reactance curves exhibit the type of symmetry shown in Figure 3; if the voltage wave is to be observed, the type of symmetry in Figure 4 is necessary. In no case should the impedance-frequency curves at the monitoring point resemble Figure 5 (with the resistance higher on one side of the carrier frequency and lower on the other) or the wave shape as seen at that point will inevitably be distorted however excellent the output wave from the transmitter may be.

CHICAGO

* Arthur Hjorth, Chicago Field Councilman, has complied with our request for P.O. Zone numbers of his group; the single "ham" in the Chicago Field Group is:—

Ray Limberg W9WRB (Inactive)

ROCHESTER

* C. Williams, of the WHEC Rochester Control group, has also complied and given us the following "ham" calls:—

C. F. Williams W2REA (75/20/10)
Al Keltz W2TXB (20/10)

New York Chapter NABET Ham Calls

By Gil McDonald

WNBC Transmitter	
W2DIT	Jack Flynn
W2TXH	Bill Haerer
W2KBA	Vince Barker
W2GYJ	A. Duffy
W2RK	Charles Francis
WJZ Transmitter	
W2KP	Nick Hagmann
W2MMS	Willie Storrs
W2AMS	Hank Treger
W2ESP	Maurice Kamke
W2CCC	Ted Cain
W2MME	Tiny Sturhann
W2JRS	Art Griffin
NBC Studios	
W2DD	Dud Connolly
W2GW	Ralph Bennett
W2ADF	Joe Silva
W2HIO	Phil Falcone
W2AUR	Ed. Stolzenberger
W2IPG	Bill Pooler
W2ALB	Gerry Sellar
W2JKO	Sal. Salanitro
W2BXY	Ed Gundrum
W2PMV	Lou West
W2CQL	Gene Hand
W2DZR	Harry Grelck
W2HFZ	Hank Folkerts
W2HEJ	Mel Lewis
W2KB	Ed Schabbehar
W2IOX	Bob Johnston
W2NX	Ed Costello
W2EP	Art Holub
W1QBO	Geo. Anderson
W2AMG	Paul Gallant
W2ABD	Carlos Clark
W2EYQ	Vic Tervola
W2UUL	Jack Ramsey
W2FZQ	Ev Geiger
ABC Studios	
W2HHK	Bert O'Leary
W2BUY	Bill Simpson
W2ND	Chas. Younger
W2CHK	Gil McDonald
W2OMT	Jim Cooke
W2HTW	Merl Worster
W1KZ/2	Al Bradley
W2PRD	Pete Narkon
W2LYC	Bill Tietz
W2KJG	Pat Simpson
W2ZA-RR	Geo. Milne
W2IP	Harold Campbell
W1ACQ	John O'Neill
W2IGB	Bob Massell
W2AEB	Irv Grabo
W2MOJ	Bill Tague
Muzak	
W2FHR	Millard Martin

THE NFTW — BELL SYSTEM STRIKE

This information has been received from, and published herein by direction of the NABET National Office.

Under date of April 18th, Pres. Bierne of the NFTW sent an 8 page letter to President Truman, all members of Congress, and Governors, etc., of the several States concerned in the telephone dispute.

This letter gave the NFTW's side of the several issues. Pertinent portions have been outlined by Cliff Gorsuch, NABET National Rep, and they are presented here for the information of the broadcast engineers throughout the country.

The NFTW was founded in 1939. It is today a federation of 49 telephone unions representing 336,000 members. It is an industrial-type union, and includes telephone operators, repairmen, splicers, linemen, clerical workers, stenos, typists, etc. NFTW says in effect that A.T.&T. has an effective monopoly, and therefor should bargain on a national level, since A.T.&T. owns controlling stock of 21 of the 23 associated Bell System companies.

The dispute was caused by the failure of the companies to bargain either at the local or national level. The Companies' initial approach was one of stall and delay; even though the companies had the NFTW demands since January, early March found the companies still requesting "explanations" of the demands. When NFTW approached the A.T.&T. with the proposition that the industry form a committee to negotiate with a committee representing the NFTW unions, the NFTW was refused; the parent company contended that the Associated Companies held the union contracts, and that therefor the local level was the proper place to conduct negotiations.

On April 14th, Sec. of Labor Schwellenbach finally made a proposal for settlement which he called fair and described as one that the parties should accept. It was rejected by the Company because it contained a method of arbitrating the issues by one arbitration board; it was rejected by the NFTW because it did not contain a wage increase offer. Of significance in this instance was the fact that the Secretary's proposal was directed to C. F. Craig, A.T.&T. Vice President, and J. A. Bierne, NFTW President, indicating that he was aware of who could settle the disputes.

The last salary increase to the NFTW was in Feb. 1946. Since that date, Consumers' Price Index has risen 18%. Average weekly telephone earnings are $43.19. 18% of this figure is about $8. Therefor on a cost-of-living basis alone, the telephone workers should have received an $8 per week raise—*just to get them back where they were a short year ago!*

As of January 1947, weekly earnings in the *telephone industry were the lowest of the major industries* in the United States. The following figures indicate the telephone workers' earnings are approximately $10 per week below other leading industries.

Telephone Industry	$43.19
Telegraph Industry	46.83
Electric Light and Power	54.00
All Manufacturing	46.94
State Railway and Motor Buses	56.32
Anthracite Mining	62.58
Iron, Steel and Their Products	50.63
Bituminous Mining	52.68
Crude Petroleum Production	55.61

The average weekly pay for the telephone operator is approximately $33 per week. These workers constitute the bulk of the NFTW members.

Historical Lag in Wage Increases in the Telephone Industry

Gross weekly earnings in the major industries in the United States have increased by 40.03 percent to 132.07 percent between 1939 and 1946. Gross earnings in the telephone industry have increased the least, that is, 37.08 percent. Telephone workers' wages have failed to keep pace with wage adjustments with other industries.

For example, while weekly earnings in the telephone industry in 1937 were $5.85 higher than the average in the manufacturing industry, telephone workers' earnings today are approximately $4 lower than the average for all manufacturing.

Wage Increases Gained by Workers During 1947

Approximately 2½ million workers received "second round" wage increases during the latter part of 1946 and the early part of 1947. The wage increases ranged from 7 cents per hour to 35 cents per hour ($3.00 to $14.00 per week). The most prominent among these wage increases were as follows:

1. $4.00 per week average increase to 60,000 meat packing workers.
2. $8.00 per week to approximately 100,000 oil workers.
3. $5.00 and $6.00 per week to 80,000 garment workers.
4. $4.60 per week to 110,000 rubber workers.
5. $7.00 per week (arbitration award) to 25,000 workers of the Consolidated Edison Company, New York City.
6. Six per cent plus $2.50 per week to 7,800 Gas and Pacific Electric Employees.
7. $8.00 per week to 20,000 carpenters in the Chicago area.
8. $13.00 per week to radio station technicians in Detroit.
9. $6.00 per week to electrical workers in the General Motors Company.

Telephone workers are attempting to narrow existing geographical differentials in the industry. Telephone craftsmen in the smallest cities receive as much as $22 per week less than the same skills in New York City. The Illinois Telephone Company has 15 different wage schedules for telephone operators; different companies have from one to ten different wage scales for plant craftsmen. At present, it takes telephone workers 8, 9, and 10 years to reach maximum scales, whereas radio technicians—a job relatively comparable—attain their maximum scales in six or less years.

Four weeks vacation are granted in other industries after twenty years or less service. The Government grants an annual leave of one month after one year service. When a holiday falls within a telephone workers' vacation, he loses the day!

NFTW asks that minimum pensions be increased from

$50 to $100 per month, and that they be granted Union Shop status.

During the dispute, the United Electrical workers obtained a 15c per hour increase from Westinghouse—adding justification to the NFTW cause.

NTFW sums up with these statements:

1. Genuine collective bargaining must precede any agreement to arbitrate.
2. A general wage increase which might be considered a down-payment in recognition of the increased cost of living will be necessary before submission of the dispute to arbitration.
3. Arbitration on a local basis if carried to its ultimate would create greater inequities between telephone workers in a single city and location than now exist.
4. Any proposition to arbitrate should include provisions for the Board of Arbitration to render its decision within a reasonable length of time.

NABET — IBEW Cooperation — II

* The following correspondence between New York IBEW 1212 President Arnold King, and Mr. David B. Stewart of the NABET Detroit Chapter, is published by direction of NABET President A. T. Powley:

IBEW Local 1212—New York

May 21, 1947.

Mr. David B. Stewart,
1160 Seward St.,
Detroit 2, Michigan.

Dear Mr. Stewart:

I am in receipt of a letter addressed to you by Mr. Clifford L. Gorsuch, National Representative of NABET. The letter is dated April 18, 1947.

Naturally I am pleased to receive such information. Not knowing how else this letter and one by Mr. Powley come by me, I assume you sent them. Who else would have your mail in Detroit?

A few years back I remember sending you information during the Petrillo "crisis." You were very alarmed. You indicated you were a fighter. We were too, and we licked the Petrillo thing right before our own International Executive Board. For a man, who is a fighter, it must be quite a come down for you to read the Gorsuch letter. It must be bitter medicine for you to read the paragraph wherein he states he is unable to divulge the source of his information but that his informer got after WFBR MANAGEMENT for not treating NABET better; for not giving them a token increase and for not giving them a union shop. Just what kind of an organization is NABET? Who is behind it? Does it sound like NAB, to you?

Our local has no trouble negotiating progressive contracts for the Independents. There is no NABET to obstruct us. With the Networks NABET obstructs . . . undersells. The most recent contract negotiated by Business Manager Calame is for a Brooklyn 1 KW station. This provides for $110.00 in three years, night differential, 3 weeks' vacation, six paid holidays, etc. WOR should be three years but it is six. The same is true of NBC-ABC.

Isn't it strange that NABET boasts of beating Petrillo but Petrillo continually gets more and more from NBC and all others. Their 20% increase gives them scales of $151.00, $158.00 and $191.00 There are no escalators. NABET's 9 percent is far from these figures isn't it? NABET by underselling the NETS undersells the entire field. A change is needed and it is not NABET. Gorsuch, in his letter to you tells the truth about NABET. That one paragraph is the truth. It is a shame NABET does not circulate more truth about itself and fewer lies about the IBEW.

Did you know that we have invited Powley to 1212 to tell us about NABET? He never appears. Did you know that Calame and I were invited to a WOR meeting but Powley kept us out? Did you know we have been trying to buy space in the NABET Journal since 1945? We have offered NABET free space in our publications. We are again requesting space in their Journal. We are also requesting permission to reprint their latest diatribe. It will no doubt prove interesting to have Powley prove his statements. I'm for it. I'm also heartily in favor of one union so that we may all receive our rightful wages. This can only come about through IBEW.

Yours very truly,
(Signed) Arnold King, Jr.
President (IBEW 1212)

Mr. Stewart's Reply to the IBEW

Mr. Arnold King, Jr.
Local 1212 IBEW
New York City, N. Y.

Dear Mr. King:

I am just in receipt of your letter of May 21, and to be frank with you, I am very surprised at the contents. How you ever received any mail addressed to me from either Cliff Gorsuch or Al Powley—I cannot figure out; on the other hand I don't remember even getting a letter from Cliff regarding WFBR. Perhaps I should contact the Postal authorities here and have them investigate the matter.

One thing I would appreciate—I wish you would forward the letters you mentioned as I would like to read my mail before it is passed out to the membership at large of the IBEW.

Another thing that amazes the hell out of me is the fact that you fellows in IBEW are taking credit for stopping Petrillo—from grabbing the turntables. For Pete's Sake, King—as you may remember—this deal was the reason that our men at WWJ-WWJ-FM and WWJ-TV pulled out of the IBEW and went NABET. Don't try and kid us on that deal because Alex Doran and I led the fight within the IBEW ranks, and finding we were getting nowhere with Brown, we pulled out from under his dictatorship, and threw in our chips with NABET, a move we have always felt good about. NABET as far as we are concerned has done a much better job than IBEW ever did for us, and we are in a much better position to judge inasmuch as we have belonged to both organizations.

If you want to make comparisons in contracts—compare the latest one NABET negotiated at WWJ, WWJ-FM, and WWJ-TV, to the last contract Freeman Hurd pushed through at WXYZ here. Those boys are being paid a top salary of $367.00 per month, compared to the $448.00 we are getting. On top of this, we have a severance pay clause that guarantees any man a week's pay for every six months he has been with the company. They get two weeks' vaca-

tion, while we get three as well as all legal holidays; we have a retirement and pension fund that costs the technical employees nothing, as well as sick and hospitalization benefit at low cost. We have four supervisors receiving 20% above scale, to one man at WXYZ getting about 10% above scale. This is just a start—on our negotiations we got much better service out of NABET than we ever did from IBEW. We have had first class men come up here to represent us and they have followed our negotiation committee's instructions, and always met with the company; no secret sessions such as Wally Reid used to pull on the boys at WXYZ and leave town after signing a lousy contract, and the membership at WXYZ holding the bag. When I see some of the representatives IBEW has in the field, such as Freeman Hurd—who is a very nice gent personally but not any comparison to the type of men who have represented us from the NABET National Office.

The line of propaganda that IBEW is putting out, Mr. King, is not the type of stuff that would sway anyone with any degree of intelligence; in fact it affords our group out here in Detroit a good laugh; and now that I have all that off my chest, let me add just a little bit more.

Neither IBEW or NABET are going to get anywhere taking pot shots at each other. I can tell you frankly that the major trouble I find with IBEW is that the broadcast technician within the Union is a minority group and has no voice either in the C.I.O. or in the A.F. of L. as a craft group. The result of this is we find linemen and pipebenders running the affairs of a highly skilled craft group who have one helluva time convincing these same pipebenders that radio technicians are worth more money than they are.

There are men working for CBS who are probably making more money than Dan Tracey is—on the other hand our NABET representatives and officers are paid a fair salary in comparison to the men they represent. We are not fighting you guys personally; we're not fighting the IBEW either, but we do get a bit tired of some of the crap that is ground out by some of your membership, as to what a bunch of jerks we are, and I felt I had to answer your letter and put you straight as to where the Detroit Chapter of NABET stood.

As soon as there is some way of the broadcast technician getting an autonomous group within the A.F. of L. you will find the whole membership ready to talk turkey.

Regarding your inviting Powley to 1212 I might say that such a procedure usually ends in a name calling rat race and I don't blame Al a bit for not showing up under such conditions. I might also add that this same procedure was suggested by some of your members here in Detroit at a Local 1218 meeting. This was proposed during the Certification hearing at the NLRB here; NABET attorney Tom Dunn was reluctant to get into any such business, but agreed to do so in order to refute some bald-faced misstatements that had been made to the membership of 1218 by Freeman Hurd. Mr. Hurd was asked point blank twice in my presence and had more excuses in declining than the average boy has for not wanting to go to Sunday School.

It seems I am getting to the end of the page here, so I think I will wind this thing up—one thing I wish you would do, King—please don't think we are such a crummy bunch as you make us out—we really aren't—and I know you fellows aren't the thugs we sometimes make you out to be. Please try and get all the radio men together—not try and get us all into IBEW or NABET—I'll let you pick the new name if you can come out with a solution—whereby all IBEW and NABET men can get into an organization—affiliated with the A.F. of L. or the C.I.O.

Thanking you for the letter and the time to read this,

Yours very truly,

(Signed) David B. Stewart

Security Clause Definitions

* In response to our requests for official definition of the closed shop, union shop, and maintenance of membership, Cliff Gorsuch, NABET National Rep, has sent us the following item from the Labor Information Bulletin, which we reprint in full:

Union Security Clauses Defined by Secretary

To dispel confusion about the various forms of labor-management union security agreements, Secretary of Labor L. B. Schwellenbach gave the Senate Committee on Labor and Welfare a concise set of definitions based on a study by the Bureau of Labor Statistics of thousands of union contracts.

The study showed that 77 percent of the workers who belong to organized labor and work under union contract, were under contracts with union security provisions. The closed shop covered 30 percent of contract workers, the union shop 15 percent; maintenance of membership, 29 percent; preferential hiring, 3 percent.

Definitions of the terms used to describe union security provisions, as given by the Secretary:

Closed Shop.—Under "closed shop" union security, the company obligates itself to hire and retain in its employ union members only. The term has been defined to include recruitments by or through the union, or the requirement that all new employees be members at the time of employment.

Some agreements modify absolute closed shop clauses by providing that when the union fails to furnish necessary workers, the employer may hire nonunion workers on condition that such workers must join the union prior to or at the time of reporting for work.

The closed shop originated and prevails in those trades and industries where special crafts, requiring high skills and long training, predominate.

Example: "It is agreed that all members of (employer's association) hiring workmen shall employ none other than members of the unions affiliated with the (local union council) carrying (council) membership cards."

Union Shop.—The union shop differs from the closed shop in that the employer is free to hire nonunion workers. Union membership may be acquired immediately following employment, or within a stipulated period thereafter.

Example: "The Company agrees as a condition of employment that all employees eligible shall become members of the union within 30 days after the execution of this agreement or within 30 days after his hire, as the case may be. All employees who become members of the union shall remain members of the union during the term of this agreement.

"The Employer shall have the exclusive right to determine the source or sources of applicants for employment, and shall be the sole judge of the requirements and qualifications of such applicants."

Maintenance of Membership.—Maintenance of membership increased in importance under the war-time sponsorship of the War Labor Board. It was designed to satisfy the objections of employers to compulsory union membership and the demand of unions for the union shop.

Under the standard maintenance of membership clause, an employee need not join the union as a condition of employment during the contract period, but if he does, or, having been a member, if he fails to resign during the "escape period" (usually 15 days) at the start of the contract period, he then must remain a member of the union for the duration of the agreement as a condition of continued employment.

Negotiated maintenance of membership clauses have varied from the standard WLB provision, principally with regard to the escape period. Some agreements omit the escape period, while others place it at the end of the contract term, or shorten the duration.

Example: "All employees who, on (15 days after date), are members of the union in good standing in accordance with its constitution and bylaws, and all employees who become members after the date shall, as a condition of employment, maintain their membership in the union in good standing for the duration of the collective agreement in which this provision is incorporated, or until further order of the Board.

"The union shall, immediately after the aforesaid date, furnish the Regional War Labor Board and the company with a notarized list of its members in good standing as of that date.

"The union, its officers and members shall not intimidate or coerce employees into joining the union or continuing their membership therein.

"If a dispute arises as to whether an employee (1) was a member of the union on the date specified above or (2) was intimidated or coerced during the 15-day 'escape period' into joining the union or continuing his membership therein, such dispute may be submitted for determination by a hearing officer to be appointed by the Regional War Labor Board. The decision of the hearing officer shall be final and binding upon the parties.

"If a dispute arises as to whether an employee (1) has failed to maintain his membership in the union in good standing after the aforesaid date, or (2) was intimidated or coerced into joining the union after the aforesaid date, such dispute may be submitted for determination by an arbitrator to be selected in the manner provided by the contract of the parties, or if no such provision exists, to be selected by special agreement. In the absence of such a contract provision or special agreement, a hearing officer will be selected by the Regional War Labor Board, on due application. The decision of the arbitrator or hearing officer shall be final and binding upon the parties."

Preferential Hiring.—Under a preferential shop agreement, union members are given a preference in filling vacancies, but the employer is free to hire whom he may choose if the union is not able to supply the workers needed. Such provisions are not common.

Example: "Members of the (union) shall be given preference when vacancies occur in the trade."

Encouragement of Union Membership — ("Harmony Clause").—Though employers are restricted by statute from influencing an employee's choice of a union, some agreements provide for certain forms of encouragement of union membership by the employer once the bargaining agency has been lawfully determined.

Example: "Manufacturers agree to support the efforts of the (union) to enroll nonmembers working in each shop."

Check-Off.—The check-off is not necessarily connected with any one type of union security. It may be combined with a standard union security provision or it may stand alone.

In *voluntaary check-offs,* employees who desire to have their union dues checked-off, are required to sign a formal authorization, which may be binding for the duration of the agreement or revocable at any time upon written notice.

In so-called *"automatic" check-off* agreements, union and employer agree that dues and other specified union obligations for union members will be checked-off without the formality of an authorization card for the individual member.

Example: "The Company will deduct from the pay of each employee covered by this agreement, all union initiation fees, dues, and assessments (a specified limitation as to the amount of union dues, initiation fees, and assessments frequently is included in an automatic check-off clause)."

Maintenance of Union Dues.—Maintenance of membership provisions of the union agreements of some manufacturing companies were replaced upon renegotiation after VJ-day, by an arrangement which provides for maintenance of union dues as a condition of employment by the use of automatic check-off. The individual employee is given the opportunity of resigning from the union during an escape period and thereby avoiding application of the check-off.

A further variation of the dues check-off has been placed into effect at the Ford Motor Co. of Canada plant as a result of an arbitration decision in 1946. There the arbitrator awarded an automatic check-off of union dues for all employees regardless of union membership. This type of union security has not found wide acceptance in the United States. However, a modication has been accepted by several woolen mills in New England.

Sole or Exclusive Bargaining.—Under sole bargaining the union representing the majority of the workers in the bargaining unit is recognized as the agent for all employees and is responsible for negotiating the working conditions under which all workers are employed, including nonunion members. There is no requirement of union membership as a condition of employment.

Example: "The Company recognizes Union No. ..... as the exclusive bargaining agency for all production and maintenance employees of the company, exclusive of executive, administrative, office, clerical employees and employees within the jurisdiction of the ..... Union, and all supervisory employees with the authority to hire, discharge, discipline or effectively recommend changes in the status of employees as to factory wage rates, hours and working conditions."

Bargaining for Members Only.—Unions may also be recognized as the bargaining agency for their members only, where a minority of employees belong to the union, or in an intrastate industry where there is no state labor relations law, or where, although the union has a majority, it has not yet exercised its rights under the National Labor Relations Act (or a similar state labor relations statute) to secure exclusive bargaining rights.

Example: "The Employer recognizes the ..... Union as the collective bargaining agency for its production and maintenance employees who are members of the Union, at the Employer's ..... works and mine."

Nonunion or Open Shop.—The terms "nonunion shop" and "open shop" ordinarily refer to operations in which there is no recognition of a union by the employer.

Television and FM News

* New York City additional FM grants went to WMCA, ABC, Unity Broadcasting, North Jersey Broadcasting, and the News Syndicate (New York Daily and Sunday News).

* New York City television assignments went to:

WOR	Channel 9
WAAT	Channel 13
ABC	Channel 17
News Syndicate	Channel 11

* Crosley Corp., Dayton, Ohio, granted commercial television, Channel 5, 76 - 82 mc.

* Fort Industry Co., Detroit, granted commercial television, Channel 2, 54 - 60 mc.

* T-Day in the Nation's Capitol was a hugh success; many dealers completely sold out. D.C. expected to provide many program-hours per week of national and international news events.

* First quarter tele receiver production: 18,329.

* First quarter FM receiver production: 172,176.

Use of Television in Industry Advanced by New RCA Camera Tube

* The use of television to observe dangerous operations in industry and elsewhere has now been made economically feasible with the introduction of a new, small television camera tube by the Tube Department of the Radio Corporation of America. The RCA-5527 Iconoscope, as the new tube is called, is itself relatively inexpensive and is designed to be used with compact, simple and low-cost television equipment. Two inches in diameter, the new tube has greater sensitivity and signal output than previous iconoscopes of this size. It provides a satisfactory picture when the light on the subject to be televised is 500 to 1000 foot candles which is roughly equivalent to the light now used in present studio telecasting and which can be obtained with three 200-watt lamps placed four feet from the subject. The resolution capability of the new tube is 250 lines; under favorable conditions, this produces a picture about equal to a newspaper photograph in quality. The low cost of the tube and the associated television equipment for it make it especially suitable for use by schools in the demonstration of television principles, and for laboratory experiments. War-born techniques resulting from experiments with military tubes contributed substantially to the design of the new tube. The greater sensitivity, for example, is the result of a new method of mosaic treatment which permits the transmission of a greater amount of light to the photosensitive surface. The greater signal output is obtained by the use of a high-capacitance mosaic which was impractical with the older type construction. Low-frequency response is improved by the use of a direct contact to the mosaic signal plate instead of capacitive coupling. Contrasting the relatively simple and inexpensive equipment required for the operation of the new television tube as compared to large types of camera tubes, RCA technicians pointed out that the new tube uses electrostatic deflection eliminating the need for costly magnetic deflection coils and circuits. In addition, since the mosaic is perpendicular to the axis of the electron gun, keystoning circuits are not required. The small area of the mosaic permits the use of a low-cost lens in the camera unit such as the lens of the 35-mm camera having a speed of: 3.5 or greater.

NABET Activity

(Continued from Page Three)

draw his edict barring live music on television programs.

* CBS reports 1947 First Quarter net income 2½% over 1946.

* Roy Glanton of WOW Omaha, elected NABET Chairman of the Omaha NABET Chapter. We expect to be able to report the remainder of the NABET elections in our next issue.

Bonus Edition

* Ed and Mrs. Editor Stolzenberger announce a daughter, Nancy, born April 28th. Everybody doing fine. Former editions, Robert, age three, and Eddie, Jr., twelve.

* A nice letter received from Engineer Ed Carter of KUJ, Walla Walla, Washington. He says in part, ". . . For years and years, the *Broadcast Engineers' Journal* has put in its appearance at KUJ every month. . . . We have enjoyed your magazine, the quips of your associate editors, and the reports of NABET Activity. . . ." Ed Carter is a member of IBEW LU-B-77, Seattle, Wash.

* From the U. S. Labor Information Bulletin:

Factory Wage Rates Up 19 Percent Since VJ-Day

Wage rates in manufacturing industries increased by 5.7 percent between April and October 1946, according to the Bureau of Labor Statistics latest survey of urban wage trends. The upward movement reflected adjustments established by major wage negotiations during the first quarter of the year. Manufacturing wage rates were 18.1 percent higher than on VJ-day and 57.4 percent above January 1941.

Substantial rate increases were apparent in all major industry groups. The largest gains were in textile, furniture and leather products industries, with advances of 25 to 30 percent since August 1945.

The Bureau estimates that wage rates continued upward by an additional 1 percent between October and the end of the year. These advances reflected "second-round" increases resulting from wage negotiations in important consumer goods industries, notably in the food, apparel, and leather products groups. At the same time preparations were under way for reopening wage negotiations in the durable-goods industries.

The postwar wage increases were virtually offset by rises in the prices of consumers' goods. Thus, wage rates at the end of 1946 were 59 percent above the January 1941 level. The impact of the 52.1 percent rise in consumers prices over the same period had, however, reduced the real gains in wage rates to about 4.5 percent.

Price Rise Highest Since World War I

Prices during 1946 advanced more than in any year since World War I, the Bureau of Labor Statistics reports. The increase in wholesale prices during the year was larger than in retail, 32 against 18 percent, and in contrast to recent years, there were substantial advances for nonagricultural as well as agricultural commodities.

Retail food prices rose 31.5 percent, nearly twice as much as in the first year of the war. Wholesale market prices of farm products and foods were up 28 percent and 47 percent, respectively. Other increases occurred in groups of commodities most of which had been relatively stable under price control in recent years. Prices of metals and metal products only 13 percent higher during the close of 1945 than at the beginning of the war, rose 28 percent during 1946. Prices of building materials increased 32 percent in 1946, compared with 11 percent in the 4 years ending December 1945.

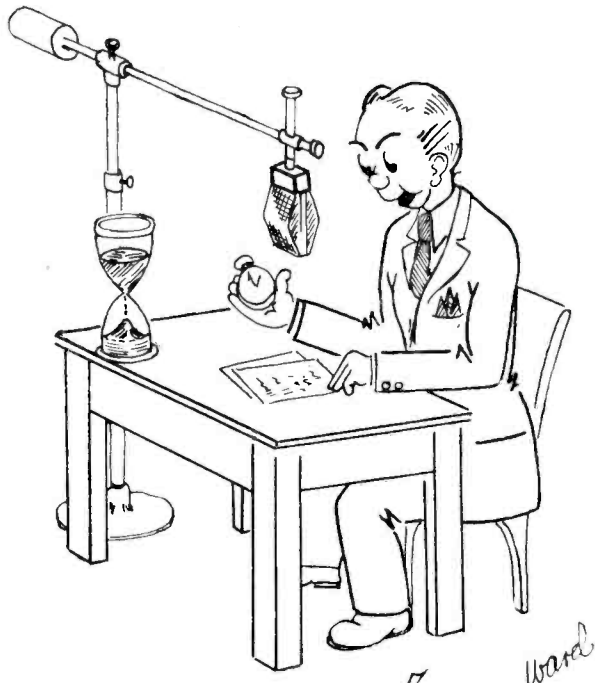
Residential rents advanced slightly. During the first 9 months of the year, rents in 34 cities surveyed rose 0.5 percent, the largest increase since Federal rent controls were instituted in 1942.

Unions Suable in 35 States

Labor unions are not exempt from suits because they are labor unions despite the widespread impression that this is the case. There is no legal basis for such a conclusion. Labor unions are exempt from suits as entities only in 13 states. These States are: Arkansas, Georgia, Illinois, Kentucky, Maine, Massachusetts, Missouri, Mississippi, New Hampshire, Oregon, Rhode Island, Tennessee, and West Virginia. In these States labor unions are suable to the same extent as are other unincorporated associations.

Under the Federal Rules of Civil Procedure making State laws concerning suits against union corporated associations applicable, there are 35 States where unions can sue or can be sued in the Federal and State courts.

(End quotes from Labor Information Bulletin.)



from San Francisco . . .

Dear Ed.:

Doggone it Ed, the May first deadline snuck up on me, and in fact, passed me by while I wasn't looking, so you will have to excuse me for the oversite.

I am going to lead off this time with a couple of humorous (?) items. The first can be related in a few words, since it concerns one of the many new ABC announcers, and his extensive search for "Memovox Commercial Copy." The ABC restricts its local use of the Memovox recorders to those programs of a controversial nature, and to assure that such programs receive proper Memovox recording, the Program Schedules are marked in such a manner that to a new announcer, Memovox would appear to be the sponsor of the program in question. Soo-o-o, this chap takes it seriously, and as I said before, spent not a few worrisome moments looking in all the copy files for the proper commercial material.

The second item had its beginning way back when the building here in San Francisco was erected,—hence, it should be of interest to Tom Phelan, Gordon Strang, and Elmer Mead, if to no one else. Anyhow, when the wiring for the Telecron clocks was installed, it included a circuit to the garage on the ground floor. When the clock circuits were rewired and rerouted to accommodate the Precision Clock system, this garage clock was overlooked by all concerned, and said clock wound up on the Precision system. All went well, for a couple of years, in fact, until the garage management decided to move their clock to a new location, and installed a six-foot Neon sign in the spot previously occupied by, and to take power from, the clock outlet. When the installation was completed, and the sign turned on, you can imagine what happened to the Precision clock amplifiers, and to all clocks on that particular leg of the system. Again, many worrisome moments were spent, and not a few faces were red, including my own, when the "short" on the clock buss was discovered!

The nominating-election ballots for SF Chapter Chairman have just been counted, and good old McDonnell received fifty-six ballots out of sixty-seven cast. Everyone here feels that Mac and his co-workers on the negotiating committees did a fine job under extreme conditions, and that the whole bunch of them should be congratulated.

The NABET "office" here has finally been given the last coat of paint, the furniture waxed and polished, venetian blinds installed, and we are all awaiting visits, official or otherwise, from any NABET personnel. How about a call, Ed?

The new KGO 50-kw transmitter is still bogged down (that's a pun, Ed., which you would appreciate if you knew the proposed location), but installation of a temporary FM transmitter has started at the present KGO transmitter location in East Oakland. Plans call for a 3000 watt G.E. transmitter to be located in one corner of the transmitter house, an R.E.L. antenna atop one of the KGO towers, etc. Present Status of KPO FM is not known, but plans are afoot. General public interest in FM hereabouts is running high, thanks to R.M.A. publicity, and an organized campaign for listeners being waged by the half-dozen or so stations now in operation or under construction.

Dick Parks was laid up with a back misery, not, as rumored, as the result of wrestling his 30-K up his front stairs, but from doing some other fairly heavy lifting in the course of duty. Dick was hobbling about with a plaster corset for a couple of weeks, and collected a good assortment of autographs thereon. So that NBC would not be outdone in ANY department by ABC, Tom Watson miseried his back in the same manner, but there is so much of Tommy in the corset region that he got by without the cast.

Duke Furhman, Norm Tapper and Bob Salle back from vacation, with Don Hall, Sam Melnicoe and "Steve" Stevens out now.

Say, Ed, much as we HATE to admit that anything done in Hollywood is worth more than just a nod in passing, I, and several others among the "early-risers", want to take this opportunity to express our admiration and congratulations to ABC Hollywood engineers Baxter and Powell, for the swell job they do on that Zeke Manners thing, daily, Monday through Friday. If you can get up that early, take a listen sometime, and you'll hear what I mean. It's terrific! (Parkhurst:—During my few years in television, Zeke and his Gang were regular fare, and were enjoyed equally by the audience and technical staff; in another two or three years, you'll know what I mean—Ed.)

I THINK that Summers, Barron, Ryder, Shover, Rothery, Cassidy, Cooper, Harvey and Sanders still work around here, as I see their names on the schedules, but I never see them personally, since I leave for home at noon, long before they are out of bed. Something'll happen sometime, and I'll be able to pass it on to you. I actually SAW Roy Fell of the Dixon gang the other day, and he assures me there is still a gang at work up there. And if I didn't talk via the station land-line to the gang at Belmont, I might think that outfit had slipped into the Bay, too. However, Ken Martin at KGO did kick through with the following items, —good ole Ken.—Pardon me, Ed while I have a chuckle—Dick Parks just walked in, at 5 aym, on his DAY OFF! O me.

Gene Nickels back from vacation via Hollywood and Reno,—moved a couple doors down the street,—but had the whole thing sorrowed by the loss of his dog, "Bonnie." We all know how you feel, Gene. And too bad that the Rangers wouldn't let you cross the border into your old home state of Texas!

"Surplus-hound" Herb Cramer, with money-bags under his eyes and velvet in his pockets, trying to peddle "junk" at hundreds of percent profit, but not many takers. Personally, the eye-bags are probably DX-eyes, but 'twas told to me the other way.

John Petty, the vacation relief engineer, "blew" in from Texas (impelled by a Ranger's boot, no doubt), and next day had located an apartment. This while numerous local-yokels are still sleeping in the gutters, for lack of better roofs. And while on the subject of housing, Don Bernard says please correct the previous statement that he is building a 2-car garage for living quarters while his house is being rushed to completion (by Don himself). Sorry, Don but you TOLD me about the garage idea.

Jim Blanchett plows under all his over-time money into his ham station, —latest "crop" being a HQ-129-X receiver to go with his HT-9 transmitter, —next planting to include a rotary beam of one sort or another. Listen for W6BGU, and give him a call, gang.

Myron Case has a new Red Ford.

Geo Irwin has a new Red (?) Fen-

der. Two things cannot occupy same space at the same time, particularly if one of 'em is a 10-ton truck, eh George?

Otis "Leave-a-thot" Hill is taking out a card in the Brotherhood of Locomotive Engineers, Junior Division. Models, that is.

'Nuf for this time Ed, so, 73, and look for me next month. I hope I won't disappoint you.

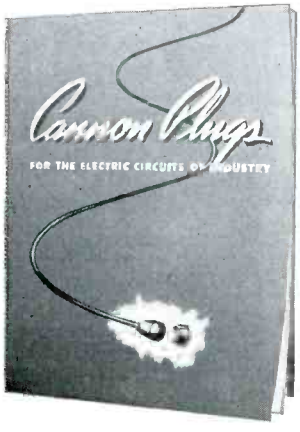
—Ed Parkhurst.

Trade News

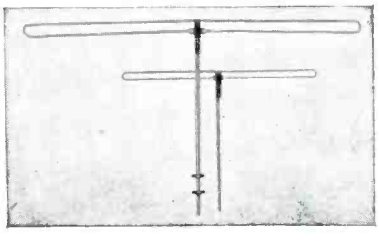
(Continued from Page Nine)

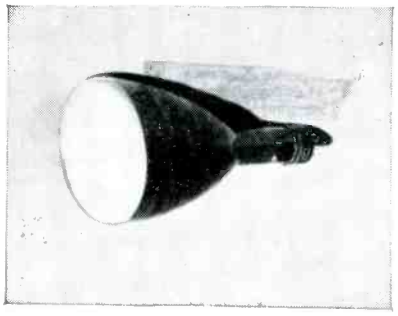
* Intra-Video Corp. announces the Telecon master television antenna system for apartment houses now ready. This will solve objection of real estate operators to individual television and FM roof-top antennas. For details write 851 Madison Ave., New York 21, N. Y.

* A 76 page illustrated book on "Cannon Plugs for the Electric Circuits of Industry" has been issued by the Cannon Co., 3209 Humbolt St., Los Angeles 13. Available free on company letter head. Covers applications in assembly, servicing, communications, power, railroads, medicine, aviation, television, mining, etc.

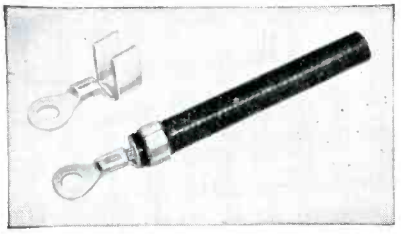


* G. E. announces two new folded dipole FM and television antennas, to match 300 ohm transmission lines. All parts are weatherproofed. Bi-directional, broadside. See cut.





* G. E. announces a new cathode-ray tube, type 7GP4 for direct-view television receivers and CRO's. Deflection sensitivity 108 volts per inch, and 89 volts per inch for the other set of plates. Electrostatic focusing. Second anode, 4,000 volts. See cut.



* Burndy Engineering announces a new, one-piece, small-wire Hylug terminal for extra-thick insulated conductors; prevents fraying of insulation as well as breakage of conductor strands.

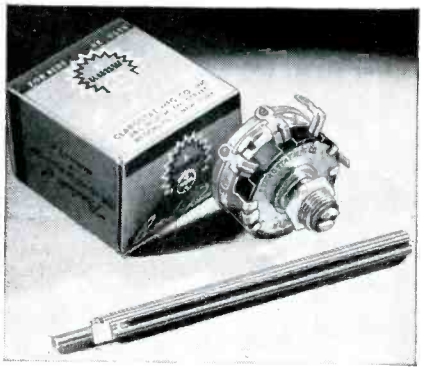
* RMA Convention, Stevens Hotel, Chicago, June 10-12, expected to attract largest industry gathering; addresses by General Sarnoff and FCC Chairman Denny.

* RMA announces production of 57½ million radio tubes during first quarter of 1947.

* DuMont Labs announce a small, low-priced voltage calibrator for use with all models of cathode-ray oscillographs. The type 264-A provides a convenient method for measuring peak-to-peak voltage of any signal being viewed on the CRO screen. See cut.

* RCA Tube Dep't, Harrison, N. J., announces 16-page booklet "RCA Phototubes, Cathode-Ray Tubes, and Special Tubes" at 10 cents per copy. Contains technical data on 113 tube types, more important of which are illustrated.

* Clarostat Mfg Co. announces Ad-A-Shaft controls without wiggle or wobble. The selected Ad-A-Shaft is simply inserted in the slot of the selected control and given a sharp blow,



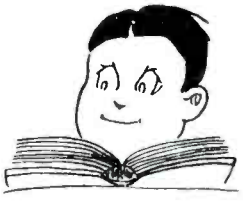
whereupon it snaps into place for a permanent job. See cut.

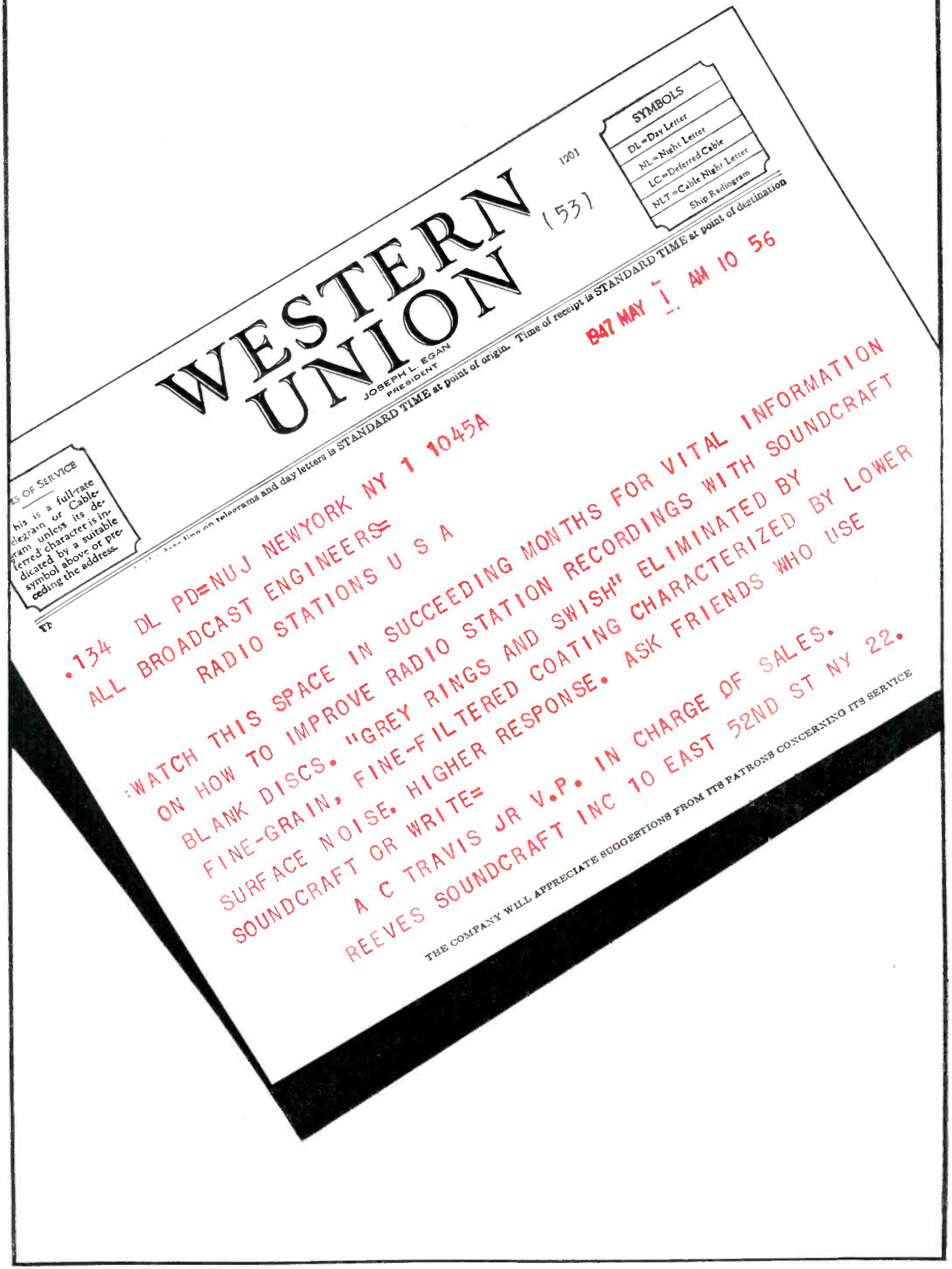
* G. E. Ham News current issue devoted totally to an International DX listing of 258 foreign points from Aden to Zanzibar, complete with prefix, zone, continent, and space to insert date worked, band, phone/CW, and QSL sent-received. To be placed on mailing list, write Electronics Dep't, Tube Division, G.E. Co., Schenectady, N. Y.

* RMA Directors discussed proposal to recommend industry-wide adoption of uniform system of marking FM dials, either by megacycles or by channel numbers; referred to RMA Set Division and June convention.

* Marion Electrical Inst. announces new method of meter dial lighting, that avoids damage to meter and keeps dust out of instrument.

* North American Philips announces a new Norelco Air Trimmer, of the concentric cylinder construction, 2½ to 30 mmf, "Q" of 850 at 1500 kc.





WESTERN UNION

JOSEPH L. EGAN
PRESIDENT

1201

(53)

SYMBOLS
DL = Day Letter
NL = Night Letter
LC = Deferred Cable
NLT = Cable Night Letter
Ship Radiogram

Time on telegrams and day letters is STANDARD TIME at point of origin. Time of receipt is STANDARD TIME at point of destination

B47 MAY 1 AM 10 56

ES OF SERVICE
his is a full-rate
elegram or Cable-
gram unless its de-
ferred character is in-
dicated by a suitable
symbol above or pre-
ceding the address.

rb

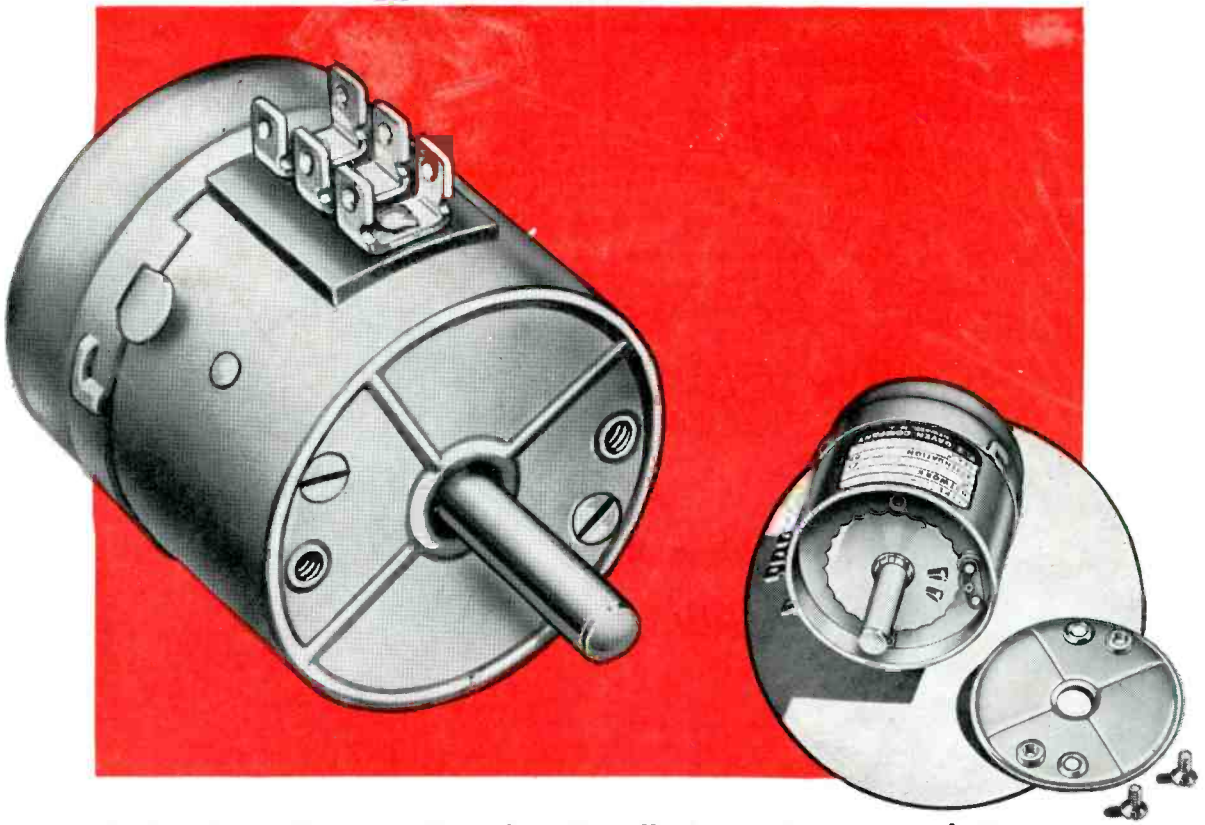
•134 DL PD=NUJ NEWYORK NY 1 1045A
ALL BROADCAST ENGINEERS=
RADIO STATIONS U S A

:WATCH THIS SPACE IN SUCCEEDING MONTHS FOR VITAL INFORMATION
ON HOW TO IMPROVE RADIO STATION RECORDINGS WITH SOUNDCRAFT
BLANK DISCS• "GREY RINGS AND SWISH" ELIMINATED BY
FINE-GRAIN, FINE-FILTERED COATING CHARACTERIZED BY LOWER
SURFACE NOISE• HIGHER RESPONSE• ASK FRIENDS WHO USE
SOUNDCRAFT OR WRITE=
A C TRAVIS JR V•P• IN CHARGE OF SALES•
REEVES SOUNDCRAFT INC 10 EAST 52ND ST NY 22•

THE COMPANY WILL APPRECIATE SUGGESTIONS FROM ITS PATRONS CONCERNING ITS SERVICE

DAVEN ENGINEERING

AGAIN BRINGS YOU A NEW AND *Better* ATTENUATOR

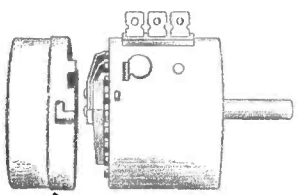


In keeping with our policy of continually improving our products, we have developed a new and better design for the mechanical construction* of our attenuators. In addition to improved standard features, the latest Daven units offer a choice of mountings and an optional ground lug. Dimensions of the new type attenuators make them interchangeable with preceding models.

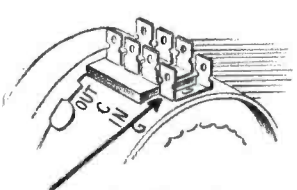
*Patent Pending.

IMPROVED FEATURES

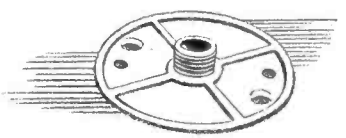
- A non-ferrous can with an attractive finish.
- A dust-proof housing which provides total shielding.
- A two piece can with a positive lock, which is constructed so that the dust cover can readily be removed with one hand. No more screws or knurled nuts to strip, misplace or drop.
- 50% less space is required than heretofore to remove the new shallow dust cover, thus permitting the unit to be mounted in a smaller space than formerly.
- Good electrical contact is assured between the front of the unit and the back cover.
- All fibre and other moisture absorbing parts have been eliminated.
- A ground lug on the shield may be supplied, if required.
- Two hole mounting is standard on the new type units, however single hole mounting may be secured.
- A roller type detent, as shown above, replaces the former ball and spring mechanism. Advantages of the roller detent are longer life and more positive action.



SHALLOW COVER



GROUND LUG



SINGLE HOLE MTG.

May we suggest, when purchasing speech input equipment, that you specify DAVEN CONTROLS.

THE DAVEN CO.
191 CENTRAL AVENUE
NEWARK 4, NEW JERSEY