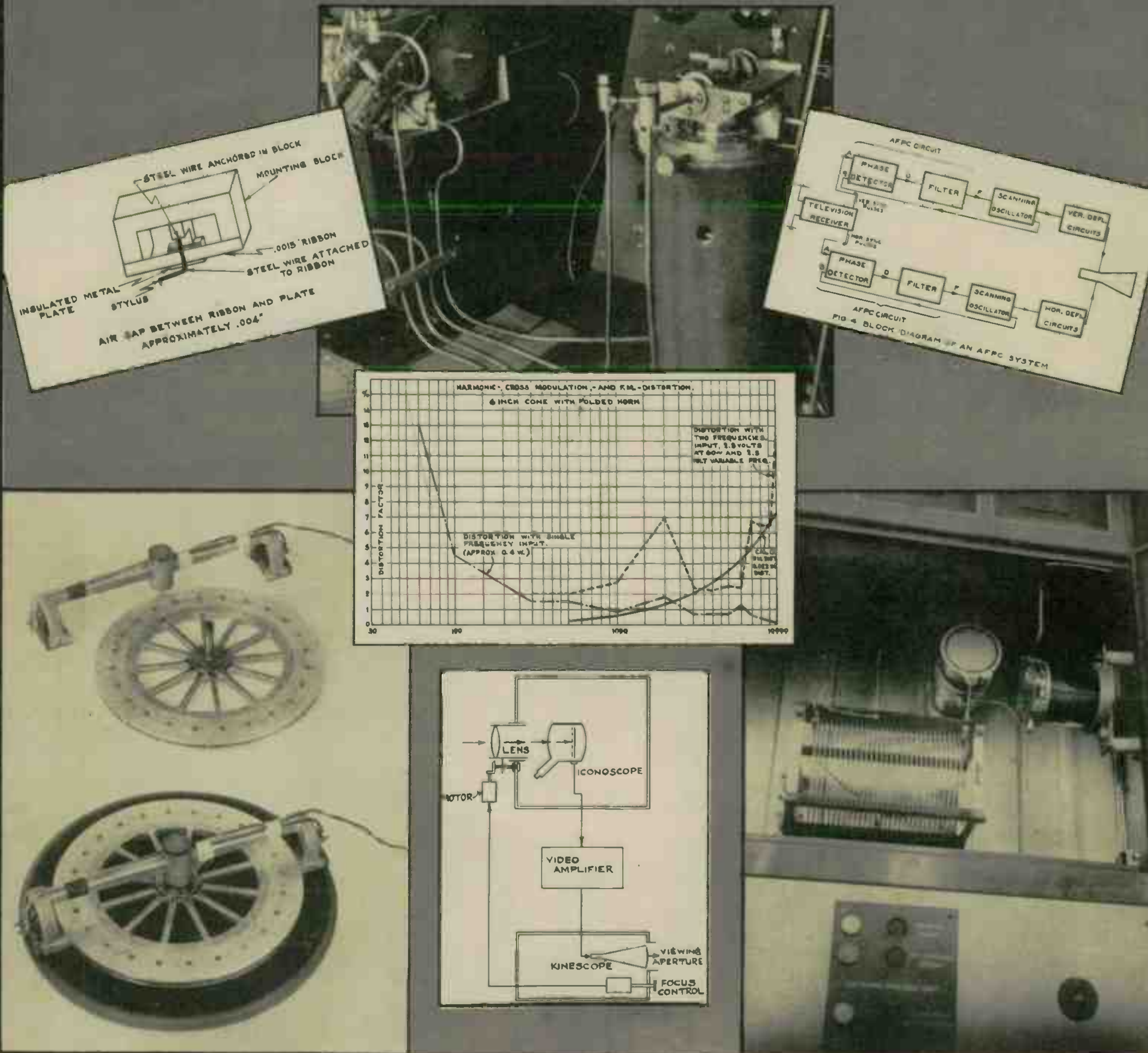
THE SCANNER

PRINTED BUT NOT PUBLISHED BY THE ENGINEERING DEPARTMENTS
RCA MANUFACTURING CO., INC.

CONFIDENTIAL

A BROADSIDE FROM RCA'S ELECTRONIC GUNS!



Vol. 7 AUGUST 1942 No. 2

THE SCANNER

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PRINTED PRIMARILY FOR THE INFORMATION OF THE MEMBERS OF THE ENGINEERING DEPARTMENTS OF THE RCA MANUFACTURING COMPANY, INC.

We are pleased this month to have an article from Mr. F. P. Tully of our Harrison plant on the subject of "Rubber Conservation at Harrison." The story of how this plant solved an important problem in their equipment maintenance program to the advantage of the war effort and themselves will interest all of our readers.

Mr. Sachtleben of our Indianapolis plant has very kindly provided us with an account of the important papers presented at the S.M.P.E. Convention which many of our readers will find of interest.

Summaries of the papers presented at the I.R.E. Summer Convention are also included for the benefit of those not able to attend the Cleveland meetings.

In This Issue

INSTITUTE OF RADIO ENGINEERS

SUMMER CONVENTION

June 29, 30, and July 1, 1942

Hotel Statler
Cleveland, Ohio

Because of the war emergency there was some question as to whether the usual I.R.E. Summer Convention should be held. Inquiry was made on this point in Washington, however, and no objection was raised so the convention proceeded according to schedule.

Some adverse comment was made on the placing of the only trip of the convention on the last afternoon and evening when many had to leave too early to avail themselves of it.

Tuesday afternoon was taken up with a symposium on "What Radio Means in the War Effort." A. F. Van Dyck was Chairman and addresses were given by the following:

Glen Bannerman, President, Canadian Association of Broadcasters, Toronto, Ont., Canada.

Paul Galvin, President, Radio Manufacturers Association, Chicago, Ill.

E. K. Jett, Chief Engineer, Federal Communications Commission, Washington, D. C.

Neville Miller, President, National Association of Broadcasters, Washington, D. C.

The editors wish to acknowledge with thanks the assistance of K. R. Wendt, who provided the write up on the Nela Park Trip, and of G. H. Brown and R. D. Duncan who provided additional facts for several of the technical paper summaries.

The annual banquet was held on Tuesday evening. At its conclusion those present were entertained by a combined talk and demonstration entitled "Strange Adventures in Discomania" by G. C. A. Hantelman, manager of the Cleveland Engineering Society. Mr. Hantelman's hobby was collecting phonograph records, particularly odd, unusual or rare recordings. He told many anecdotes concerning these records and played some where a demonstration added to the interest. Incidentally, he gave Victor records and Victrolas several good plugs either consciously or inadvertently.

At a luncheon on Tuesday Frazier Hunt, G. E. Co. news commentator gave an interesting talk on some of the behind the scenes facts about the war.

Technical Sessions

Twenty-four technical papers were presented, of these, RCA engineers presented seven or 29%. These papers are listed by title and author only at the point where they occur in the program.

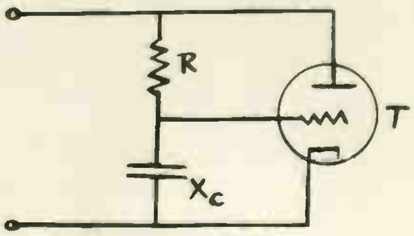
Monday Morning

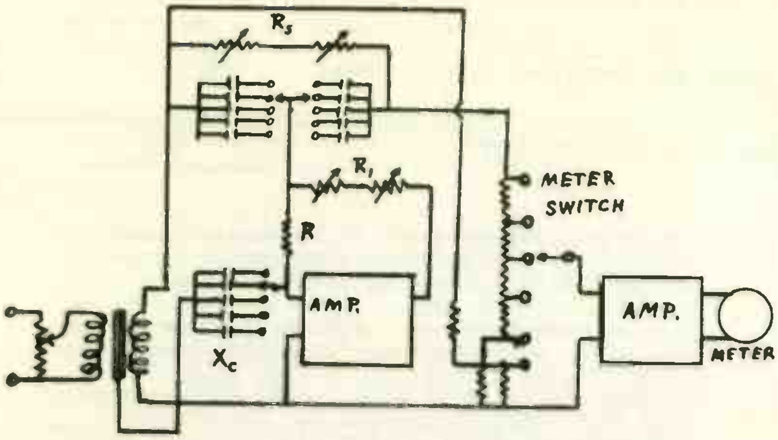
After brief addresses of welcome by the Chairman of the Cleveland Section, the Chairman of the Convention Committee and Mr. A. F. Van Dyck, President of the Institute, this technical session got under way.

The first paper was by I. P. Rodman of Columbia Recording Corporation on the subject "Recording Standards." The speaker described the work of the National Association of Broadcasters on the matter of standards for transcription records, starting with a meeting they held in January 1941. This was followed by the formation of a "Recording and Reproducing Standards Committee" in June of that year. In May of 1942 the committee issued some tentative standards. These were circulated to all 77 members of the Committee as well as to all the N.A.B. broadcasting stations. While these standards have not received the formal sanction of the Committee or the N.A.B. Board of Directors, it is felt that they form the best specifications that can be prepared at this time and may be used temporarily pending formal approval. Copies of the tentative standards were passed out and a copy is available in E. T. Dickey's office for reference by those interested. Matters covered by the standards include: mechanical dimensions and tolerances, turntable speed, wow factor, starting and stopping grooves, and recorded frequency characteristics for vertical and lateral recordings.

The next paper was by G. L. Beers and C. M. Sinnett of RCAM, Camden, on "A New Approach to the Problem of Phonograph Reproduction." The paper was presented by C. M. Sinnett. This was followed by a paper on "Measuring Transcription-Turntable-Speed Variations" by H. E. Roys of RCAM, Indianapolis. Copies of both these papers are available in E. T. Dickey's office for reference by those interested.

The next paper was by J. E. Hays of the Canadian Broadcasting Corporation on "A New Type of Practical Distortion Meter." The speaker employed the basic bridged-T audio-frequency bridge circuit in this instrument. The difficulty of getting the desired variation of inductance to cover the necessary audio range and with adequate values of Q resulted in the substitution of a reactance-tube circuit for the inductive element of the bridge. The basic reactance tube circuit use is shown in Fig. 3. The variation in inductance is obtained by varying the value of R. Equations were given to show how the values of Q, the gain and other optimum operating characteristics of the circuit were calculated. Feedback was used in the reactance tube amplifier to stabilize it against supply-voltage variations. A range of 10-to-1 in inductance was obtained with this circuit and this, together with variations of capacitance by means of taps, permitted the instrument to cover a range of from 30 to 10,000 cycles. Fig. 6 shows the complete instrument circuit partly in block diagram form. The output meter is a "VU" meter and its amplifier is also stabilized against supply-voltage fluctuations.





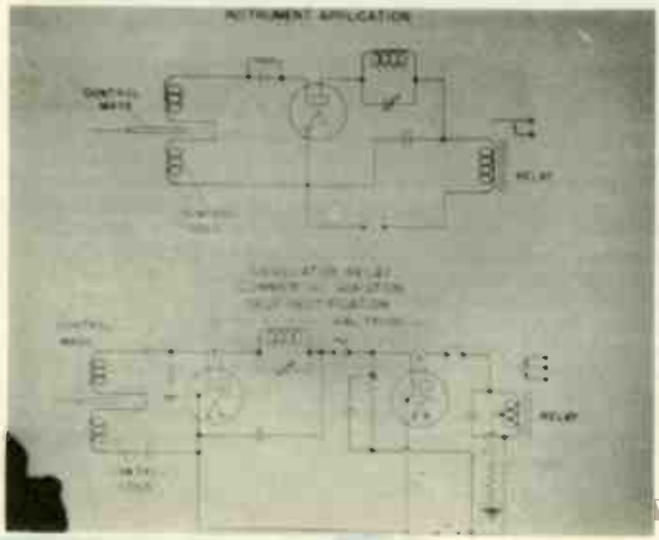
It was pointed out that if the values of R_B, R_1 and R of Fig. 3 were varied simultaneously in the proper ratio, the value of Q would be constant for various frequencies and the accuracy of the instrument would be the same at all frequencies. Variable resistors having a linear taper were used for these ganged resistors.

This instrument is limited to use on circuits involving only low voltages. These must be kept below the point where the amplifiers involved would introduce distortion.

The next paper was by G. L. Beers and H. Belar of RCAM, Camden, on "Frequency-Modulation Distortion in Loudspeakers." G. L. Beers presented the paper. A copy of this paper is available in E. T. Dickey's office for those interested.

Monday Afternoon

The first paper at this session was by T. A. Cohen of Wheelco Instruments Company on the subject "Radio-Frequency Oscillator Apparatus and Its Application to Industrial Process-Control Equipment." The author first discussed the recent rapid growth of industrial process-control instruments and in particular the substitution of electronic for mechanical devices for providing this control. The addition of contacts to the delicate moving mechanisms of sensitive galvanometers has often been found to seriously interfere with their accurate functioning. The speaker therefore proposed a device which he designated as a universal r-f oscillator relay. It was based on an oscillator circuit of the tuned-plate, tuned-grid type in which actuation of a relay in the plate circuit was provided through the change in plate current caused by altering the strength of oscillation by detuning one circuit slightly. The circuit shown in the accompanying figure illustrates one way of accomplishing this. Here a small very light metal vane is brought between two split coils forming one of the oscillator tuned circuits. This causes the relay in the plate circuit to be operated. Motions of the vane of as little as 0.001" were said to be sufficient to actuate the relay. The vane could be attached to the moving mechanism of a galvanometer without interfering appreciably with its normal functioning or sensitivity.



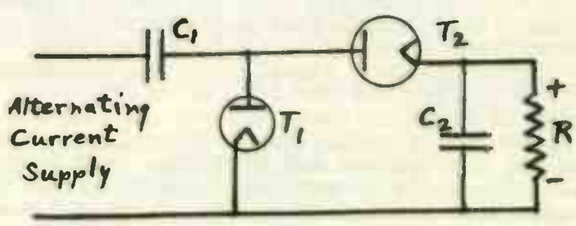
The use of changes in circuit capacitance instead of inductance was also mentioned; applications to the measure of flow and level of liquids, viscosity, etc., were illustrated.

The next paper was by V. K. Zworykin, J. Hillier and R. L. Snyder of RCAM, Camden, on the subject "The Scanning Microscope." Dr. Zworykin delivered the paper. A copy is available in E. T. Dickey's office for those interested.

The next paper was by S. L. Parsons of Hygrade Sylvania on "Spectroscopic Analysis in the Manufacture of Radio Tubes." The speaker showed photographs of the laboratory setups used in this work. An electric arc was used to heat the materials to be analyzed. After the photographic plates were developed the densities of the spectroscopic lines obtained for the various elements were measured to determine the quantity of the element present in the sample. The speaker discussed at great length some of the special problems encountered in such analytic work in connection with tube manufacture.

The next paper was entitled "Minimizing Aberration of Electron Lenses" by H. Poritsky of G.E. Co. This was a highly mathematical discussion of the problem of spherical aberration, neglecting chromatic aberration entirely. The speaker drew an analogy between the paths of electrons and geodesics on a proper surface. This provided a basis for utilizing various results familiar in differential geometry of surfaces in the investigation of the electronic problem.

The next paper was on "Half-Wave Voltage-Doubling Rectifier Circuit" by W. D. Waidelich and C. H. Gleason of the University of Missouri. The speaker explained by the use of the accompanying figure how his circuit differed from the familiar voltage-doubling circuit. To distinguish his from the latter he designated his a half-wave circuit and the conventional type a full-wave circuit. He stated that basic characteristics of his circuit could, for convenience in plotting, be referred to the value ωCR. Numerous performance curves of the circuit plotted in this fashion were shown. It was pointed out that condenser C_2 could be of the



electrolytic type since the voltage never reversed on it. C_1, however, could not be an electrolytic since it did reverse polarity during certain load and other conditions.

The lecturer did not make clear during the presentation of the paper just what advantage this circuit had over the conventional voltage-doubling circuit. This was brought up in the discussion and the speaker stated that the conventional type had the advantage of requiring less filtering of the output since it contained twice the supply frequency. The half-wave circuit, however, was said to have the advantage that one side of it could be grounded and the inverse voltages on the tubes were stated to be lower with this than with the full-wave circuit.

Tuesday Morning

This session began with a paper by J. A. Ouimet of the Canadian Broadcasting Corporation on "Maintenance of Broadcasting Operations During Wartime." The author discussed the maintenance: (1) of normal operations under conditions of war economy; (2) of restricted operations during war action; and (3) of essential operations after partial distruction of facilities.

Iron wire fences are provided around all the CBC stations and each station has an armed guard on constant duty. Floodlighting provides visibility of persons moving around the neighborhood of the stations. Sand barricades are provided around vulnerable parts of the stations. As in the U.S. the problem of procurement of new equipment or parts for repair or replacement is a serious one. An inventory has been taken of all spare supplies in the stations so that they can be found and shipped at a moment's notice to any place where they are urgently required.

The possibility of saving by reducing time on the air was considered but it was found necessary to increase rather than decrease the time because of longer hours and use of third shifts of workers who would otherwise not receive service at a time when they could listen. A 20% reduction in power of transmitter output is being considered for adoption since it would not seriously affect the service area and would cause a definite increase in tube life.

To provide against the destruction of stations or equipment, portable and remote pickup equipment has been carefully and safely stored away ready for immediate use. Portable remote pickup trucks are available as well as other types of equipment for emergency use.

The next paper was by H. B. Fancher of the G.E. Co. on "High-Power Television Transmitter." The design factors involved in the development of Station WRGB, located in the Helderberg Mountains, including a 40-kilowatt visual transmitter and a 20-kilowatt aural transmitter, are described. The part of the visual transmitter located at the main station consists of a high-frequency receiver, a converter, and a chain of linear class B push-pull amplifiers. The transmitter receives a standard modulated vestigial-sideband signal from its Schenectady studio or from the New York relay station, about 1½ miles distant, in each case over a high-frequency radio link. The relayed signals are not demodulated and thus some loss in signal-noise ratio is avoided. The two final stages each consist of a pair of water-cooled triodes (GL-8009) which were especially designed for television service. The special features involved in building stable circuits for these tubes were discussed. The visual antenna consists of a conical doublet fed by an open-wire shielded line which matches the antenna impedance. The output frequency is maintained constant independent of variations in the incoming signal by means of a unique automatic-frequency-control system. This system was described in much detail.

The aural transmitter consists of a 50-watt exciter unit containing the oscillator, modulator, and frequency-control unit; a 2-kilowatt amplifier consisting of air-cooled triodes; and a 20-kilowatt amplifier using a pair of tubes similar to those in the visual power amplifier. The antenna consists of a cubic array giving a circular field pattern.

The next paper was by W. F. Goetter of the G. E. Co. on "Frequency-Modulation Transmitter-Receiver for Studio-Transmitter Relay." The author discussed at some length the question of how much swing to provide for the station pointing out difficulties in getting as much as ±200 kc swing and giving the arguments favoring a swing of ±75 kc. The 25 watt transmitter described employed a new small type of tube utilizing coplanar elements and provided with air-cooling fins, apparently built on the tube. The transmitter was built for operation in the 260-350 Mc range. The antenna consisted of 5 co-linear horizontal dipoles with driven directors. A power of 10 was claimed. The dipoles were housed in bakelite tubing. No ice-melting provision was said to be required.

Straight frequency-modulation was used at the transmitter with 75 kc swing. The oscillator frequency was 5 Mc with automatic control of the mean frequency. The radiated frequency was arrived at by a combination of multiplication and heterodyning. The speaker claimed a noise level of minus 70 decibels and distortion of less than 0.5 per cent.

The receiver was crystal-controlled, was of the double-conversion superheterodyne type and employed two limiters. High-gain transmitter antennas were used with special enclosing features to prevent trouble from ice formation.

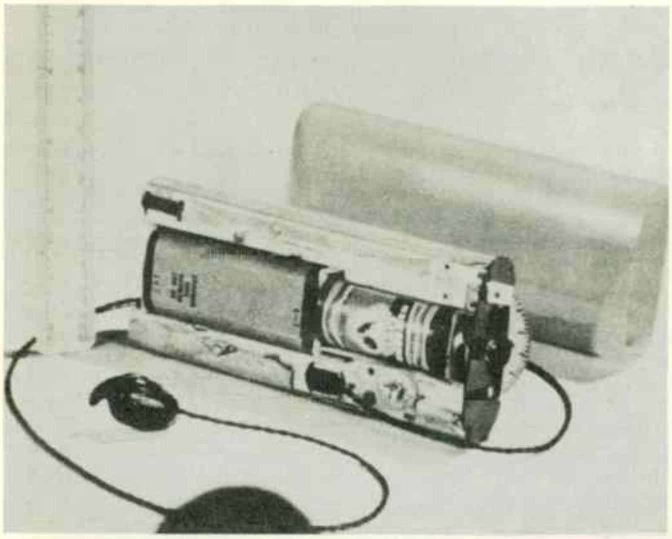
The next paper was on "Effect of Solar Activity on Radio Communication" by H. W. Wells of Carnegie Institution of Washington. The author showed a number of ionospheric recordings using both fixed and multi-frequency techniques to illustrate the relation between solar activity and disturbances in the ionosphere. An automatic recording system had been used to record the reflections from different heights at different frequencies. In cases of solar flares or eruptions in daylight the result was practically a total fade out of the signals in the usual frequency ranges used for communication. The ultra-violet radiation associated with these solar flares results in intense ionization in the lower part of the ionosphere. This results in complete absorption of all normal sky-wave radio transmission.

The most severe radio disturbances occur at the time of intense magnetic storms and these are frequently associated with active sunspot areas. It is generally believed that streams of corpuscles are shot out of the active sunspots. These travel to the earth in from one to four days and then produce magnetic storms, auroral displays and radio disturbances. Photographs were shown of the sunspots which caused the intense auroral and other disturbances of last September. It was shown that the effects did not occur on the earth until several days after the sunspot area had passed the point in the sun's surface directly opposite the earth. This illustrated the time lag caused by the time of travel of the corpuscles from sun to earth.

Curves of sunspot activity since 1840 were shown illustrating the eleven-year cycle of recurrence of maximum peaks. These curves showed this present year to be one of rapidly declining activity and that we will soon reach the time of minimum sunspot activity.

The next paper was by W. J. Brown of Brush Development Company on the subject "Development of a Pocket Radio Receiver." The author pointed out that the recent advent of small tubes and other small components for hearing aids had led his company to investigate the possibility of developing a pocket radio of smaller than usual dimensions. Having ear-phone units for their hearing aids they adapted this phone to radio use. Because of the very compact nature of the receiver itself it was not practical to provide a loop or other antenna pickup means within the receiver case. Since there had to be wires from the receiver to the ear phone, these were utilized for the antenna. Circuit means were provided to keep the r-f and a-f voltages from causing feedback or other operating difficulties. A TRF circuit was employed in this first sample though the speaker stated that a superheterodyne circuit would undoubtedly be used in any commercial design.

Moving iron-core tuning was employed and the batteries were placed between plate and grid circuit elements to help in shielding them from each other. A wrap of tinfoil around the entire unit was used for further shielding. The accompanying photograph shows the receiver with its case removed. The ear unit will be seen in

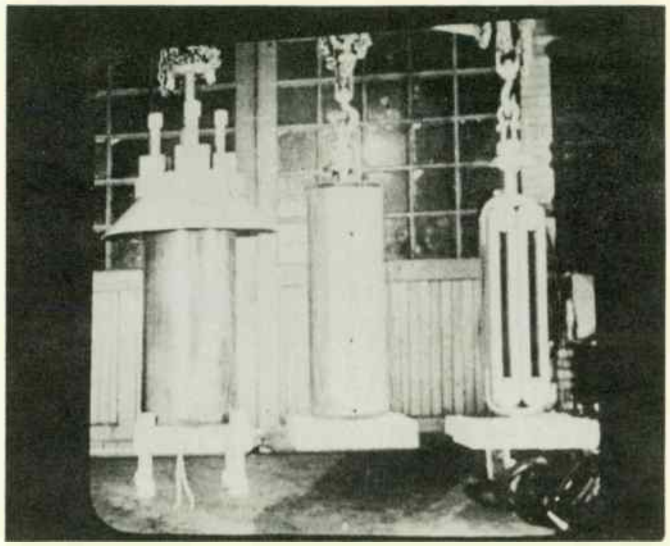


front of the receiver. Because of the great power sensitivity of the earphone employed it was not necessary to use a powerful output tube. The author stated that it was difficult to give, for this receiver, data on sensitivity which would be comparable to the usual receiver sensitivity figures. However, he said that, in general, the receiver would provide an adequate signal at a distance of from 20 to 100 miles from a 50 kw transmitting station.

The earphone had a small metal diaphragm actuated by a crystal unit and the whole mechanism was encased in soft rubber so formed as to fit conveniently in the left ear. Holes provided an outlet in the casing through which the sound could reach the channel leading to the eardrum.

Wednesday Morning

One of the papers scheduled for this day had to be omitted due to failure of the speakers to arrive. The session opened with a paper by A. O. Austin of A. O. Austin entitled "Radio Strain Insulators for High Voltage and Low Capacitance." The author discussed the various types of constructions which had been used for power transmission and radio-frequency use, pointing out the difficulty in getting low capacitance in the cone or compression type insulator construction. The problem of reduction of surface leakage was also discussed. The porcelain-rod type had some advantages but it was easily shattered by a blow, even though its tensile or compression strength were adequate. An insulator was then described and pictured by slides in which a bakelized fabric link was used as the tension member in the center. This was surrounded by oil held in the container formed by an outside porcelain tube and two metal end flanges. This oil prevents corona and flash-



over. The insulators are pre-stressed. Views of these insulators are shown in the accompanying photograph. This shows from right to left the fabric links, these with bakelite sleeve around and the complete insulator with outer porcelain tube. It was pointed out that insulators which were good for radio-frequency use were also desirable for power-wire support work since they would also be free of trouble from radio interference.

The next paper was a companion paper to the one just mentioned. It was by the same author on the subject "Improved Insulators for Self-Supporting or Sectionalized Towers." The speaker continued with a discussion of the same type insulator showing the methods of placing the central core under tension and the outer casing under compression. He showed figures indicating that this type insulator had a length efficiency of 83% as against 26% for the push-pull porcelain-cone type. To further strengthen this insulator and make it safe some are made with a bakelite sleeve inside the porcelain tube. This is of particular advantage when the insulators are used on self-supporting masts where they may be under tension at certain times and compression at others. This construction prevents the insulator from collapsing as a result of the outer porcelain portion being shattered by a blow or shot.

The use of heat, supplied by 60 cycle heaters in the base of the insulators, has been found advantageous in many cases to guard against trouble in fog and other very damp conditions. The reliability against failure and freedom from necessity for replacement were shown to go up many times by merely using two insulators in parallel instead of a single one.

The author mentioned that wind-tunnel investigations were being carried on in the University of Michigan by a research pool having funds provided by Truscon, Blaw-Know & International Derrick Company.

The next paper was a "Brief Discussion of the Design of a 900-Foot Uniform-Cross-Section Guyed Radio Tower" by A. C. Waller of Truscon Steel Company. The author first discussed self-supporting versus guyed masts stating that the former had advantages in taking up less ground area (no need for guys) while the latter became less bulky for high masts. It was stated that problems of design of towers necessitated the study of the wind intensity, temperature range and ice deposit factors for the location under consideration. The effect of wind velocity on various mast structures was discussed at some length. The problems of providing adequate foundations for masts and guy anchorages were discussed. It was pointed out that the choice of swampy or similar types of land as the location for a station frequently added many difficulties to the problem of mast foundation design and erection.

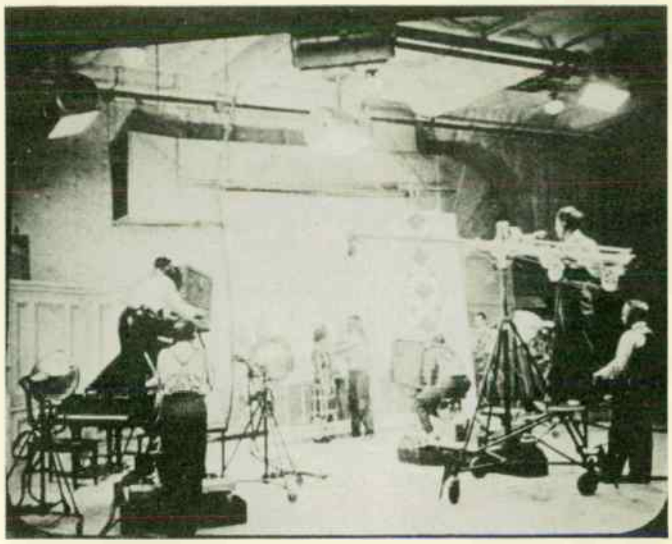
The next paper was by J. E. Keister of the G. E. Co. on "Television Video Relay System." The system described was that used to relay television signals from the Empire State transmitter to the G.E. station in the Helderberg Mountains. A slide was shown illustrating that the relay station was about 130 miles distant from the transmitter and one mile below the line of sight. A Rhombic antenna was used at the receiver and terminated in 600 ohms to avoid reflection of signals. The frequency characteristic of the antenna had a flat portion sufficient to cover the first two television channels. The receiver circuits were 4.75 Mc wide using transformer-coupled stages. Special filter means were provided to prevent coupling between stages through the filament, cathode and other common wires. A system of output-frequency control was described involving a crystal oscillator, discriminator, reactance tube and master oscillator. Very good control was claimed for signals having the strength which was needed to provide worthwhile signals from other respects.

This was followed by a paper entitled "A Solution of the Problem of Adjusting Broadcast Directional Arrays with Towers of Unequal Heights" by J. M. Baldwin of Station KDYL and G. H. Brown of RCAM, Camden. A copy of this paper is available in E. T. Dickey's office for those interested in reviewing it.

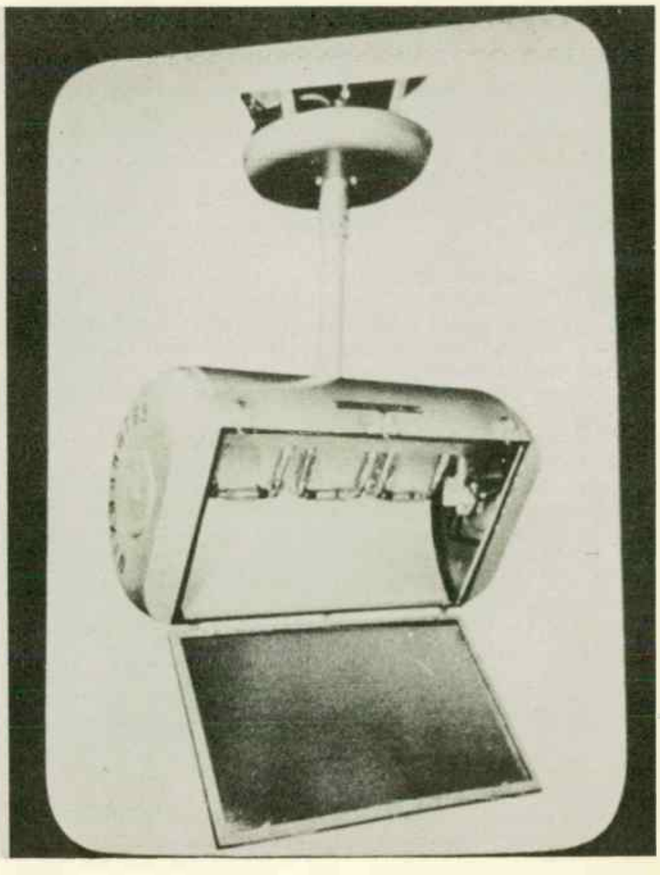
Wednesday Afternoon

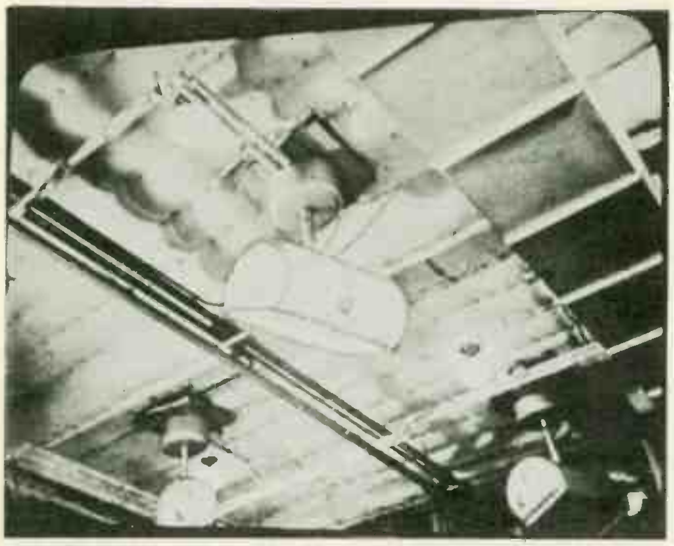
The first paper was by C. A. Breeding, G. E. Co., on "Mercury Lighting for Television Studios." The speaker discussed the experiments made by his company using water-cooled mercury lamps. A scene in the WGY television studios was shown and is reproduced in the accompanying photograph. The light source was stated to be about one inch in length. A large reflector was found desirable to spread the apparent source and reduce glare of the individual lamps. The lamp supports were swiveled on two axes so the lamps could be turned at various angles in both the horizontal and vertical planes. Small motors provided remote operation of the lamps. Three lamps were used in each reflector unit giving a total per unit of 70,000 candle power. The accompanying photograph shows one of the reflector units opened to show the three mercury lamps.

The control desk was raised about ten feet above the studio floor to provide ease of view



for the operator. These lamps were stated to provide 11.8 lumins per watt per square foot of illuminated area. The light provided by the type A-H6 lamp, near the end of the lamp's life, drops to about 65% of its original illumination intensity. A life of 75 hours is average. Starting the lamps shortens their life. If burned continuously 300 hours of life may be obtained. The three lamps in a given reflector are operated on three-phase current to avoid flicker. A tabulation was shown giving the division of radiated energy of the lamps from the ultra violet through the heat end of the spectrum. The speaker stated that the light from these lamps was cooler per lumen than sunlight and during the discussion he said it was a little cooler than that from fluorescent lights.



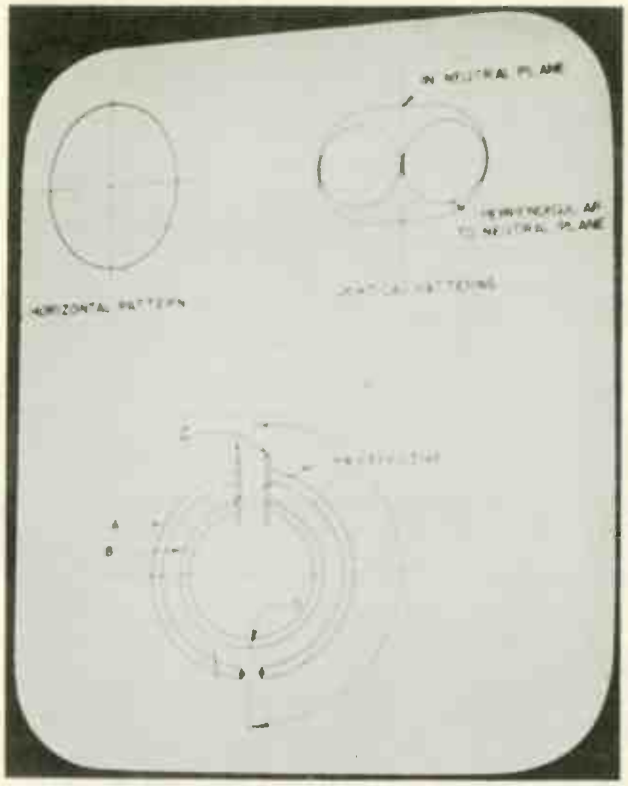


The next paper was by G. L. Beers of RCAM, Camden, on the subject "The Focusing-View-Finder Problem in Television Cameras." A copy of this paper is available in E. T. Dickey's office for those interested.

The next paper was by K. R. Wendt and G. L. Fredendall of RCAM, Camden, on "Automatic Frequency and Phase Control of Synchronization in Television Receivers." This paper was presented by K. R. Wendt. A copy is available in E. T. Dickey's office for those interested.

The next paper was oy M. W. Scheldorf of the G.E. Co. on "Circular Antennas." The speaker started by showing one of the square forms of antennas used at the Schenectady television station in the Helderberg Mountains. It had been previously pointed out by the engineer who delivered the paper on this latter subject that this square antenna was used for the transmission carrying the sound portion of the program. The antenna was probably not capable of being sufficiently broadly tuned to cover the video band. Scheldorf then showed the basic construction of the circular antenna. The structure is illustrated in the accompanying figure where A is the primary and B the secondary. B is grounded to the mast or other supporting structure at point D. Heavy steel pipe was used for the circular conductors. A sketch was then shown indicating the approach to constant current obtained by this antenna structure. This was claimed to give a close approach to a circular radiation pattern. Curves of the variation of resistance and reactance with frequency were shown as well as the gain with number of bays. Two different transmission line feeder arrangements were shown for use - one with high-power and the other with low-power installations.

The speaker next discussed measurements made on the radiation pattern from the antenna and it was pointed out that difficulties were encountered in using more than four units on one pole. This was said to be due to the necessity for increasing the size of the pole at the lower sections with the result that if more than four units were used the lowest unit was so close to the pole itself that the latter was in the energy field of the circular antenna structure. The question of the best location for guy wires with respect to the vertical plane of orientation of the antenna was discussed. Radiation patterns under various conditions were shown. An adaptation of this antenna structure to a motor car was shown by slide and by a small model and the radiation patterns, both vertical and horizontal, were shown. The



speaker stated that this antenna gave as good radiation characteristics as those of the conventional whip antenna while the advantages from a mechanical construction standpoint were claimed to be considerable. A small model of a 4-bay circular antenna was exhibited and a full scale model of a single circular antenna was also available for inspection.

Nela Park Trip

In view of war conditions, only one trip had been arranged for the engineers at the Convention. This was scheduled for Wednesday afternoon and evening following the last technical session which ended at 4:30 p.m. The first stop was at Nela Park which is the lighting research laboratories of the General Electric Company. For the write up on this trip we are grateful to K. R. Wendt.

Upon arrival (by street-car) at Nela Park, which is truly a park, and beautifully kept, we were shown the latest industrial lighting equipment, including fluorescent, mercury and filamentary types. An interesting sidelight was blackout lighting for use in buildings which do not have blacked out windows. For instance, a large fluorescent system may be adapted without additional circuits by paralleling small filamentary lamps. Upon reducing the line voltage approximately 50%, the fluorescents go out leaving the filamentary lamps to give the required low illumination of 1½ to 3 lumens. This is sufficient to prevent stumbling over objects even for an unadapted eye, as for instance upon entering blacked out area from a well lighted one.

We were then conducted through G.E.'s exhibit of modern home illumination and then to their dining hall where we enjoyed an excellent dinner.

We were next given a further exceedingly interesting demonstration of blackout lighting. It was demonstrated that for levels of light existing when some blackout illumination is necessary, the average eye can see detail a great deal better with red than with blue light. For very low levels of light which might be present on the ground as observed from a plane, the dark-adapted eye is much more sensitive to blue than to red light. The difference is even more startling when the observer does not know the light location and must use the corners of the field of vision. Therefore, red or red-white light is to be preferred, and blue is positively to be avoided.

The Nela Park trip was concluded with a talk on color magic and a film of the G.E. all-girl orchestra under Phil Spitalny, featured on their "Hour of Charm" program.

We then walked the several blocks to the Warner-Swasey observatory. We were shown their new telescope which is of the Schmidt type with a lens 24 inches in diameter and a mirror 36 inches in diameter. Dr. J. J. Nassau gave an extremely interesting lecture on astronomy, illustrated with pictures made on the new telescope. He is very enthusiastic about the large field and high definition obtained with the Schmidt-type optics. During the lecture he made many references to television and its use of Schmidt optics. The sky was so overcast on the evening of our visit that observation through the telescope was impossible.

--ooOoo--

These photographs were taken at the I.R.E. dinner given at Bloomington on the occasion of the I.R.E. Section Meeting reported by Mr. J. G. Badger in our March issue.

RUBBER CONSERVATION AT HARRISON

By Frank P. Tully
Equip. Dept. & Standardizing Section
Harrison Plant

In the manufacture of radio tubes, a great number of processes involve the use of gas fires. Since the burners on the machines are frequently in motion and always adjustable, a flexible connecting medium is required to convey the gases from the fixed manifolds to the burner piping.

Time honored custom had made rubber tubing the standard for this purpose. This was due, of course, to the fact that rubber tubing represented an item of ready availability, low in cost and convenient to install.

In addition, the many connectors between valves, traps, pumps, gauges, etc. on evacuating and sealing machines, consist of moulded rubber sections of an almost pure gum.

Thus, with the first whispers of possible rubber scarcities in the spring of last year, there came a realization of our great dependence upon rubber. The Harrison management set up a Rubber Conservation Campaign at once. Operators, maintenance people and engineers were coached in ways to prolong the life of the rubber on hand. Employee suggestions to the same end were solicited and encouraged with generous awards. Alternates were sought out and tested and a control point was established to investigate and authorize the use and purchase of new rubber only after a rigid examination of its need.

Through the resultant plant-wide publicity, an overall conciousness of rubber was quickly developed among our people. Hereditary maintenance procedures in replacing rubber connectors on a time-scheduled basis were abandoned. The need for such replacements now had to be justified beyond a doubt. Sections of tubing were shortened where possible by lengthening the adjacent piping. Tubing found unsuitable for one use was salvaged for others. Consumption bogies were established for departments and innovations were improvised almost daily to reduce the need of rubber. The major share in these matters emanated from the employee group whose response to rubber conservation efforts was whole hearted and effective.

Tubing

Trials of flexible plastics and synthetic rubber-like materials were inaugurated to develop a general purpose alternate for rubber. These resulted for the most part in an early recognition of their limited possibilities for replacement of rubber as used at our plant. Some were dropped because they showed signs of uncertain availability. Others were dropped because they contained high percentages of natural rubber and so seemed to offer no greater hope than of getting us out of the pan but shortly into the fire.

Our search eventually narrowed down to a comparatively few materials. Prominent among these was "Resistoflex" a semi-plastic product made of polyvinyl alcohol. We found resistoflex to be highly resistant to the many solvents that deteriorated the rubber used in our various metal cleaning and other manufacturing processes. These involved the usual carbontetrachloride, trichlorethylene, acetone and many others. Our tests showed that tubing made from resistoflex would convey hydrogen, oxygen, nitrogen, city gas and air as effectively as rubber. Such tubing has since stood up for months even though saturated with hot oil and subjected to continuous flexing at a rate of about six hundred times an hour.

The commercial tubing first offered us by the Resistoflex Corporation lacked the flexibility that we desired. However, in cooperation with that company's engineers, a form of tubing was later worked out that has proven extremely satisfactory. We have standardized on this for many uses where a quantity of high-grade gum rubber was formerly employed. The life of this tubing has proven to be far in excess of that frequently experienced with rubber. An application placed on a machine nearly a year ago has shown no sign of depreciation, whereas the rubber originally used had to be replaced as often as five times a year.

Installations of the alternate tubing are now made with little or no change in a machine's design. Stocked in a comparatively few sizes to match the standard pipe-size nipples used, it is quite as readily adaptable as the original.

Tubing of this type has furthermore displaced, to a large extent, our use of flexible metal hose, usually made of brass, copper, stainless steel, etc. In certain instances conventional copper tubing and fitted piping are also being so displaced.

Machine Parts

Many of our machines employ rubber parts of a highly mechanical nature. Conservation activities in this field were undertaken with the cooperation of the Resistoflex people. They progressively revamped samples of their sheet stock to make it conform to the Durometer index and texture of the rubber we normally used. The simplicity with which blocks of this material may be fabricated, was of considerable help in making our tests. Pieces were cut or punched from 1/16" or 1/8" sheet. These were then laminated into finished washers, spacers, rollers, etc. Rough shapes so formed were further machined to required dimensions. Some such sections were forzen solid in liquid air or mounted onto wooden blocks to facilitate machining.

In these mechanical applications, involving abrasive action and torsional strains, resistoflex has consistently out lasted rubber. A typical instance involved a power transmission device, wherein a revolving turret carried a series of heads, which in turn were revolved in a sequence of indexed positions. The heads were caused to rotate when their shallow-toothed drive gears were brought into mesh with rubber rings clamped to driven shafts below the turret.

In another case a two-ply tube was formed by rolling 1/16" sheet about a 3/8" diameter mandrel. The tube was installed in a sandblast suction line where rubber tube would wear through in a few days. The replacement tubing has been running for several weeks with no apparent sign of wear. Sandblast shields made of resistoflex sheet have shown to similar advantage over rubber.

We are developing a growing list of cases where the alternate material has become the standard in place of rubber. Among these are such mechanical parts as forming rollers, aligning devices, vibration dampeners, shock absorbers, power-transmission drives, foot pedal coverings, metal belt pulley facings and others. It is called for in ball mill cover gaskets where it is subjected to solvents that destroyed the gaskets previously made of rubber. A small conveyor belt, made by cementing sections of sheet together, has proven superior to a belt made of woven wire.

We believe we can feel easier in mind in having, even to this extent, relieved ourselves of a dependence upon rubber. We are happy too, to have been able thus to release, for more direct use by the armed forces, a share of that rubber, which in our own war effort we should have otherwise required.

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MEASUREMENT THROUGH THE AGES*

Although Cheops' mighty pyramid was so accurate in dimensions and rectangularity that modern surveying instruments detect no error, the basis of Egyptian measurement was the cubit - length of the forearm from point of elbow to tip of middle finger. Every man was a walking measuring stick - but no two exactly agreed. The Royal Egyptian Cubit, for example, first known measurement, averaged 20.62 in. Shorter-armed Greeks used the Olympic Cubit, averaging 18.24 in. They built buildings compensating for optical illusions, more perfect than anything built by man before or since. But the best they could do with the cubit was to break it into two spans of 9 in., six palms of 3 in., and 24 digits of 3/4 in. each, the latter of course based on finger widths. The Romans, copying the Greeks even in dimensioning, called two thirds of the Olympic Cubit a "foot," and divided that into twelve thumb-nail breadths, called "unciae." Anglo-Saxons, after Caesar's conquest, anglicized the word to "inch," and correlated it with their own seafaring "fathom," the distance across a man's outstretched arms - equal to 72 in. or 6 ft.

After William the Conqueror, the British decided that half a fathom was more convenient in measuring cloth, their most important article of trade. Hence the "Cloth yard," which Henry I (1100-1135) standardized as the distance from his nose tip to the end of his thumb with arm outstretched. Relating current measurements to kindly dimensions was common; not only the king's word, but also his foot and arm, were law in those days! But kings, too, were human, so the official "foot," for example, varied all the way from 9-3/4 to 19 inches. Similar variations occurred in thumb-nail breadths and in arm lengths, so Edward II decreed in 1324 that an inch thereafter was to be the total of three barley "corns" or grain from the center of the ear laid end to end. He also started our particular inch subdivisions by observing that eight barley corns, again from the ear center, laid side by side, also equalled an inch. But two hundred years after he was dead and gone, the English were still busily measuring distances in rods, officially standardized as the combined length of the left feet of sixteen good men and true lined up as they left church on Sunday morning!

Queen Elizabeth, bach in 1558, officially okayed a bronze bar a yard long, which was kept as the Standard of Reference in the King's Exchequer, first at Winchester, then at Westminister. It remained the standard until 1824, when it was superseded by Bird's Standard Yard, developed in 1760. Fire in Parliament destroyed the Bird Standard in 1834, and new imperial standards were not produced until 1855, when two copies came to the United States, to be compared with the accepted 36 inches of the Troughton Scale and accepted the following year as American standards by the Office of Weights and Measures. Congress passed the act legalizing the metric system as the standard for the United States on July 28, 1866. Meanwhile, Watt had made his vital contributions toward improvement of the steam engine. He finally succeeded in producing engines in quantity because his workmen learned to fit piston and cylinder to the "thickness of a thin shilling" - about 1/40 in.! The resulting Industrial Revolution brought metal-working machines and accompanying needs for more accurate measurement, both for production and for testing.

Less than a century ago - in 1851 - Sir Joseph Whitworth invented the first measuring machine using end standards, and capable of detecting differences of one millionth of one inch. Joseph R. Brown invented the Vernier caliper, capable of measuring to the thousandth, the same year. A French micrometer caliper of 1848 was a forerunner of the Brown & Sharpe micrometer sheet-metal gage of 1867, which became our familiar "mike," now capable of measuring to the ten-thousandth. In 1882 came the comparator, and in 1896 the first Johansson gage blocks, two devices which made great strides toward extremely accurate measurements and interchangeable production. Today's measuring devices, accurate to the millionth, permit standardization of 25.4 mm. as the practical equivalent of 1 inch - the long-needed bridge between English and metric systems. Thus it is less than a hundred years from the variable inch to the fixed millionth - forty-six thousand times finer than the thickness of a new dime, three thousand times finer than a human hair. Yet such accuracy is essential, for instruments accurate to the millionth must be used to produce gages accurate to the hundred-thousandth, which in turn permit dies accurate to the ten-thousandth and mass production of parts to the thousandth.

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*This article is reproduced by permission from the February, 1942 issue of "The Dragon," a publication of The Fafnir Bearing Company. Acknowledgment is also made to "Iron Age" from which "The Dragon" reprinted the article.

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VIEWS SHOWING RECENT STATUS
OF WORK ON
RCA LABORATORIES' BUILDINGS

View of Main Laboratory
Wing from the North

View of Laboratories
from Fairview Avenue

View of Power House and Other Buildings
from Roof of Main Laboratory Wing

Sound and Television Studio

Field Laboratory

One of the Laboratory Rooms with Bench
and Power Installations Partially Completed

View of Model Shop
from East End

51ST SEMI-ANNUAL CONVENTION
SOCIETY OF MOTION PICTURE ENGINEERS

May 4-8-inclusive - 1942
Hollywood-Roosevelt Hotel
Hollywood, California

By L. T. Sachtleben
Sound Engineering - General Development
RCAM - Indianapolis

RCA was represented at the Convention by papers by Messrs. George Urey, Watson Jones, G. L. Beers, A. Goodman, E. Stanko, C. M. Sinnett, L. T. Sachtleben, H. Belar, E. E. Masterson and E. W. Kellogg; covering a wide range of subjects including projection equipment, test equipment, television, record reproducers, lenses, loud speakers and 16-mm projectors. The Eastern divisions of RCAM were represented at the Convention by Messrs. Beers and Sachtleben.

The more interesting portions of the convention sessions attended by the writer are summarized in the following:

Standardized, interchangeable men and parts are the ideal of military engineers. Mr. Wm. Exton, Jr. of the Bureau of Navigation, Navy Department, Washington, D. C., told of the part motion pictures are playing in standardizing the training of our naval forces in an excellent paper entitled "Audio-Visual Aids to Naval Training." Apart from its use in recruiting, in aiding the procurement of equipment and in building morale, the motion picture makes it possible for the entire Navy to be taught by the same teacher, so to speak. This insures a constancy of response of the trained man, more or less independently of his place of training, and contributes immeasurably to the smooth working of the naval unit. An example of a training film was shown, in which the elements of the "Weft" (wings, engine, fuselage, tail) system of aircraft identification were taught in an unforgettable manner.

Captain Guy Newhard, of Wright Field, Dayton, Ohio, presented a vivid picture of the effective use to which motion pictures are put by the air force in his paper "The Motion Picture Camera in Army Air Forces." As examples: they test airplane structures and even whole airplanes to destruction, the motion picture camera being the incontrovertible witness to what failure took place, and where and when it occurred; they study the opening characteristics of parachutes under actual service conditions, by means of the slow-motion picture; they photograph the laying of a smoke screen to facilitate study of the technique of that particular activity of the air force. These merely illustrate the hundreds of applications of motion picture photography to the building of our air force.

Mr. G. L. Irsky, of the Amtorg Trading Corp., New York, spoke on "Technical Progress in the Motion Picture Industry of the Soviet Union." There are separate and substantially independent studios in each of the 16 Soviet provinces, and Soviet productions are dubbed in some 30 to 40 languages. In a large degree they employ substantially all of the technical devices used in the American industry. There are about 40,000 projection installations in the Soviet Union, and 80 per cent are sound equipped.

Mr. Winton Hoch, of the Technicolor Corporation, Hollywood, gave a general talk on the technique of Techni-color Photography, as part of a symposium on The Technic of Motion Picture Production. The present Technicolor Camera is a large and heavy device which exposes three color-separation negatives. Parallel with its development, work has been done on processes for making Technicolor prints from Monopack (three layer) originals such as Kodachrome. Prints made from the Monopack originals never have equalled the quality attainable by the three-color separation-negative process, particularly with respect to freedom from grain. Examples of prints made by both processes were shown and bore out Mr. Hoch's comments on graininess. The writer, however, liked the colors better in the prints from monopack originals.

Mr. J. K. Hilliard, of MGM Studios, Culver City, California, presented "An Analysis of the Complete Sound Recording System Now Used by MGM Studios." At the close of this very detailed paper some special test films were run in illustration of their system's ability to record difficult material such as impact noises, cymbals, bells, whispers, screams, metallic sounds and the wide range of frequencies required by music. It was generally agreed that the demonstration displayed the best variable density sound that has been heard to date. The special demonstration was followed by some commercial-release material in which the improved quality of the test films was not in evidence.

An interesting paper on dubbing entitled "Loop Synchronization" was given by Mr. Theodore Hoffman, of MGM Studios, Culver City, Calif. A print of the scene or portion of a scene to be synchronized is projected, as a continuous loop with appropriate start mark, and the sound rehearsed as many times as required. When the rythmic pattern of the sound has become well established through rehearsal the take is made, usually without the knowledge of the performers. Many poor or otherwise unsatisfactory or objectionable sound takes are thus made over without the need of assembling an entire company or holding them for additional combined sound and picture takes; the savings are said to be large.

In his paper on "Production of Industrial Motion Pictures," Mr. Lloyd Thompson, of the Calvin Company, Kansas City, Mo., pointed out that his company uses the double-film 16-mm system and considers the sound obtained by printing an original 16-mm sound negative superior to sound reduced to 16-mm from an original 35-mm sound negative.

Mr. Alexander Goetz of the California Institute of Technology talked on "Light Scattering by Graininess of Photographic Emulsions." Mr. Goetz defines the graininess of a photographic emulsion in terms of the steepness of the grain-size distribution curve. Thus, a film of zero graininess would be one in which all sizes of grains occur equally, while a very grainy film would be one in which the grains are mostly of the same size. The lecturer had found that the scattering of light by the grainy structure of the photographic emulsion was independent of the graininess so defined.

Mr. E. W. Silvertooth of Paramount Pictures, Hollywood, described a method of rating the speed of photographic lenses in his paper "A Proposed Standard for Determining the Effective

Speed of Photographic Objectives." Work on this subject has become more than ever necessary now that some studios are coating their lenses to increase definition and light transmission. After coating, a lens is increased in speed by an amount depending upon the number of surfaces involved, the kinds of glasses in the lens, etc. Such lenses must be measured in terms of an established standard speed rating if the camera men are expected to match exposures between several lenses.

As a contribution to the Symposium on the Technic of Motion Picture Production, Messrs. George Urey, of RCAM, Hollywood, and Herbert Starke, of RKO Service Corp., Hollywood, presented a paper on Projection. The emphasis was on sound, rather than the picture, and described the part played by the final step in picture production, namely, its presentation to the public.

Mr. L. L. Ryder, of Paramount Pictures, Inc., Hollywood, described a Graphic Fader which is used at previews to make a graphic record of required changes in reproducer levels. The device advances, at a rate of 3 feet per minute, a paper tape on which the fader settings are indicated by a line drawn by a stylus connected to the fader knob. Errors and corrections in the record may be noted on the tape in pencil by the operator. When re-recording for the final adjusted level print, the record of the fader settings is followed and the gain lowered or raised the indicated amount at the proper time as indicated by the tape passing a second time through the Graphic Fader. Provision is made for indication of audience response - such as laughs - on the tape, and such records are valuable in further editing work on the print.

A long and detailed paper was given on "Motor Drive Systems for Motion Picture Production" by Mr. A. L. Holcomb of Erpi. The paper should be of much interest to those working with interlocking motor-drive systems of whatever nature.

Short subjects for Technicolor Release are now being made on 16-mm Kodachrome. Mr. L. W. O'Connel of Warner Brothers Studios, Burbank, Calif., in his paper "The Photographing of 16-mm Kodachrome Short Subjects for Major Studio Release" described the procedure, the most important part of which consists in protection of the 16-mm original from damage. All editing is done on a 35-mm black and white print. When this is finished, Technicolor makes a duplicate 35-mm color print from the original 16-mm Kodachrome, by enlarging to the usual three 35-mm color separation negatives and imbibition printing.

"Theater Experiences With Fantasound" were described in a paper by Messrs. Watson Jones, of RCAM, Hollywood, and W. E. Garity, of Walt Disney Productions, Hollywood. Fantasound was installed in over twenty theaters throughout the country. Owing to the large amount of equipment necessary to the exhibition of Fantasia, and to the fact that few of the available theaters were first-class houses with ample projection-booth space and adequate power supply, a large proportion of the installations were "tailor made" at the expense of considerable effort and money. Although the Fantasound installation involved several times as much apparatus as a standard-theater-sound installation, the sound "outages" experienced with it were no more than with a standard installation. This is in itself a tribute to all who had to do with the planning, design, manufacture, installation and operation of Fantasound. The equipment made an excellent impression upon projectionists who worked with it. A typical Fantasound installation was exhibited to the Convention at the Carthay Circle Theater in Hollywood, and projection of a portion of Fantasia accompanied the paper.

Mr. E. H. Plumb, of Walt Disney Productions, Hollywood, spoke on "The Future of Fantasound." The growth and evolution of the initial idea that eventuated in the production "Fantasia," was traced to indicate that at bottom Fantasia was an experiment to test an assemblage of theories and ideas, and to answer questions as to how best to make and exhibit a production of such a nature. As such, its practical aspects are being closely studied with a view to improvement through changing the original recording and microphone pickup technique, through modifying the arrangement and use of speakers in the theater, through simplifying and cheapening the technique and the equipment throughout and through modifying the artistic conception which underlies such a production. Much has been learned from the Fantasia experiment; much will be heard of the more fully developed forms of the "Fantasia idea" in the future.

Mr. G. L. Beers, of RCAM, Camden, discussed "The Focusing View-Finder Problem in Television Cameras." The function of a view-finder on a television camera was described, and its ideal requirements outlined. The fact that all the ideal requirements cannot be met by any single type of view-finder was revealed through discussion of the characteristics of a large number of actual view-finder types. Compromise designs are thus necessary. They divide into two groups: one being more suitable for studio application where size and weight are not particularly important factors; and the other being more suitable for portable or location-type television cameras.

Mr. George Urey read a paper on the "RCA Audio Chanalyst - A New Instrument for the Theater Sound Engineer," by Mr. A Goodman and Mr. E. Stanko, of RCAM, Camden. This paper described the design and use of a new measuring instrument for analyzing the performance of an audio-frequency channel. Physically it is a single, compact, easily portable unit, with which the characteristics of an audio channel are analyzed while the channel is in full normal operation.

In a paper on "Some Recent Developments in Record Reproducing Systems," Mr. G. L. Beers and Mr. C. M. Sinnett, of RCAM, Camden, analyzed and described the characteristics of an experimental-frequency-modulation pickup. An improved frequency response and improved signal-to-surface-noise ratio were shown to be possible with this new design.

A simplified approach to the problem of designing condenser lenses was outlined in a paper on "A One-Ray System for Designing Spherical Condensers," by Mr. L. T. Sachtleben, of RCAM, Indianapolis. It was shown that by computing the course of a single ray through a proposed condenser system, a condenser will result: which has the correct shape to minimize spherical aberration; which has the correct center thickness for its assumed diameter and edge thickness; and for which the location of the disc of least confusion, or best focus, is known. The method is applicable to condensers comprising more than one lens, and leads to the required design with a minimum number of relatively simple trials.

A paper on "Frequency Modulation Distortion in Loudspeakers" by Messrs. G. L. Beers and H. Belar, of RCAM, Camden, presented theoretical and experimental evidence for the existence in loud speakers of frequency modulation of the high frequencies by the low frequencies. Insofar as the elimination of this particular distortion is concerned, the investigation vindicates our use of separate high-and low-frequency speakers in theater reproducer channels.

Messrs. E. E. Masterson and E. W. Kellogg, of RCAM, Indianapolis, contributed a paper on "A Study of Flicker in 16 mm Projection," in which experimental evidence was presented to indicate that the habitual method of testing projectors for flicker by viewing the illuminated screen without picture, is unwarrentedly severe. Were 35-mm projectors required to produce a flicker-free, pictureless screen, as are 16-mm projectors, the level of theater screen illumination would have to be seriously reduced, yet no one complains of flicker on the theater screen as long as he always sees a picture on it. Therefore, in cases where the 16-mm projector is to be used under fairly constant conditions, as in a school auditorium installation, projection without picture need not be flickerless, and the three blade (or equivalent) shutter with its serious sacrifice of light is no more necessary than in the theater, where it is obviously not needed. A number of interesting aspects of flicker in the 16-mm projector were discussed in this paper.

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INTERFERENCE BETWEEN PINION AND RACK TEETH

By E. C. Conrad
Research Drafting

The writer submits the following formulae relative to the subject matter in the hope that they may prove useful to mechanical designers since most handbooks do not cover this phase of pinion and rack design.*

It should be noted that when the rack teeth are cut with an involute cutter the interference herein described does not take place; it takes place only when rack teeth are cut with straight sides as is the case in most commercial stock racks. Interference will occur between the teeth of a rack and pinion when the point B, Fig. 1, which is the intersection of a perpendicular from the point O to the line of pressure AL, falls inside of the rack addendum line EE. In the figure the distance over which the interference takes place is CD.

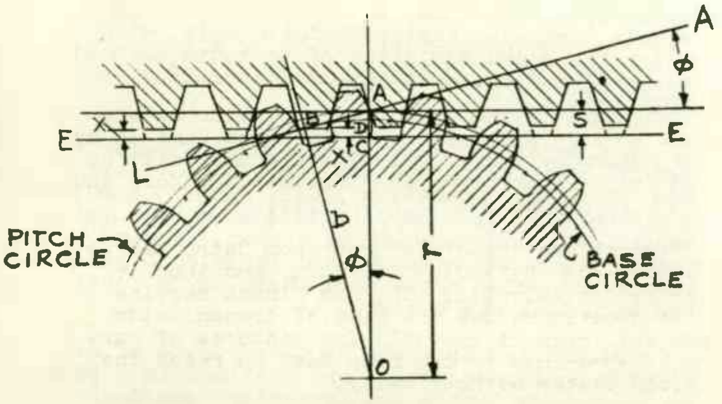

FIG. 1

INTERFERENCE OF GEAR AND RACK

*This material is reprinted from the "American Machinists' Gear Book" by permission of the publisher, the McGraw Hill Book Company.

The top of the rack tooth may be relieved, that is, the interfering portion may be trimmed off since that part of the tooth is useless anyway.

Let N = the number of teeth in the pinion
P = the diametrical pitch
r = the pitch radius
b = the radius of the base circle

Let ϕ = the pressure angle
x = the distance necessary to shorten the addendum of the rack tooth and
s = the normal addendum of the rack tooth

Then

$$s = \frac{1}{P}$$

$$r = \frac{1/2\ N}{P}$$

$$b = r \cos\phi$$

$$OD = b \cos\phi$$

$$OD = r \cos^2\phi$$

$$OC = r - s$$

$$x = OD - OC \text{ and substituting}$$

$$= r\cos^2\phi - (r - s)$$

$$= \frac{1/2\ N}{P}(\cos^2\phi - 1) + \frac{1}{P}.$$

Whence

$$x = \frac{1 - 1/2\ N\ (1 - \cos^2\phi)}{P}$$

For a pressure angle of 14 1/2°

$$x = \frac{1 - 0.03135\ N}{P}$$

For a pressure angle of 20°

$$x = \frac{1 - 0.05849\ N}{P}$$

Solving these equations we find that for the true involute form of tooth and a pressure angle 14 1/2°, interference between the rack and pinion begins with a pinion of 31 teeth. Similarly for 20° pressure angle the interference begins with a pinion of 17 teeth. Pinions of more teeth than 31 or 17, respectively, show no interference because the interference points are far enough away so that neither addendum extends beyond them.

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ORGANIZATION CHANGES
Effective April 1, 1942

L. B. MORRIS, Vice President and General Counsel of RCAM, who for the past few years has spent considerable time in the study of, and dealing with, the general, social and economic changes as they effect employe relationship with Management, Government and Labor Unions, is transferred to the office of the President. In his new position Mr. Morris will devote all of his time to the above activities.

Mr. Morris is succeeded by J. H. McCONNELL, who is appointed General Counsel of RCAM.

JOHN CARTER is appointed Assistant General Counsel of RCAM.

Your wholehearted cooperation with these gentlemen in their new responsibilities will be appreciated.

R. SHANNON

...'''...

J. A. KELLY APPOINTED
RCA EMPLOYMENT MANAGER

John A. Kelly, veteran of 12 years in the factory and office divisions of the RCA Manufacturing Company, has been appointed Employment Manager.

Mr. Kelly succeeds Harold T. Albright, who has been appointed Personnel Manager at a new plant being erected by the Company. Mr. Kelly's new duties will come directly under Rowland C. Maslin, Assistant Manager of the Personnel Relations Division.

A native of Poughkeepsie, N. Y., Mr. Kelly was graduated from New York University in 1930 with a Bachelor of Science degree in Mechanical Engineering. He joined the RCA Manufacturing Company the same year as a student engineer.

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NOTICE

April 1, 1942

The following appointment is announced effective today:

Mr. G. L. Beers, in addition to his present duties of Advanced Development, will be in charge of the Manufacturing Services Division, formerly in charge of Mr. A. L. Pipper.

The activities for which Mr. Beers will be responsible are as follows:

Advanced Development
Blueprinting
Chemical Engineering and Chemical Preparation
Standardizing
Photographic
Styling and Nameplates

The Equipment Development and Engineering Model Shop will continue under the direction of Mr. W. Paul and will report to Mr. Pipper.

...'''...

RCA RE-ESTABLISHES RADIO COMMUNICATION
WITH EAST INDIES THROUGH SUMATRA

Radio communication between the United States and the Dutch East Indies, was re-established on March 11 by R.C.A. Communications, Inc., with the opening of a direct radiotelegraph circuit between San Francisco and Medan, capital of Sumatra. Communication with the East Indies had been broken office since March 7, when Batavia fell to the Japanese invaders.

Working in collaboration with Dutch Government communications officials, RCAC established the new circuit following a series of preliminary tests.

One of the first messages to travel over the new circuit was from a bank in Madras, India, to its branch office in Medan. Although a distance of only 700 miles across the Bay of Bengal separates the two points, the Japanese had cut the cable between India and Sumatra, and direct radio service was not available. The bank in Madras, therefore, sent its message by wire to Bombay, India. From Bombay it was relayed to London by radio. An RCA radiogram then went from London to New York, from New York to San Francisco, and from San Francisco to Medan. Altogether, the message travelled around the globe a total distance of 27,000 miles.

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RADIOPHOTO SERVICE OPENED BY RCA
BETWEEN NEW YORK AND CAIRO, EGYPT

The first direct radiophoto service between this country and Egypt was opened on June 24 by RCA Communications, Inc. The pictures will be handled in both directions between New York and Cairo, a distance of 5,639 miles.

Heretofore, news pictures from Cairo had to be forwarded by radio to London, and then across the Atlantic. The new direct service will greatly reduce the time of transmission and will make it possible for pictures of current happenings in the near East to reach the United States without delay.

The Egyptian end of the circuit is operated by the Marconi Radiotelegraph Company of Egypt, and is equipped with radiophoto apparatus of RCA design and make. The rate is forty cents a square centimeter, with a minimum charge of $60.

...'''...

NEW TRANSPACIFIC RADIO CIRCUIT
LINKS UNITED STATES WITH NEW CALEDONIA

Emphasizing the flexibility of radio in meeting the new demands of war on communication facilities, R.C.A. Communications, Inc., announced on March 13 the opening of a direct radiotelegraph circuit between San Francisco and Noumea, Island of New Caledonia, Free

French outpost in the Southwestern Pacific.

First direct communications link between the island and North America, the new radio circuit removes the previous necessity of contacting Noumea by way of Australia. RCAC cooperated with the New Caledonia Administrative Center of General de Gaulle in establishing the Noumea connection. Noumea is the center of a local radio communications network linking the other Free French islands of the New Hebrides, the Marquesas, Tuamotu and the Society Islands.

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RCA VICTOR PLANS "EVOLUTIONARY" CHANGE OF RECORD NUMBERS SYSTEM

In the interest of convenience and clarity, RCA Victor has embarked on a long range, evolutionary change of the present numbering system on Victor and Bluebird records.

The series assigned to the various classes of records under the old system were verging on exhaustion. Rather than "rebuild" the old system, RCA Victor has, for the past year, been conducting an extensive survey to develop a better system and one that would not require further changes in the future.

That system has been found. However, in order to avoid the confusion usually born of innovation, the transition from old to new systems will be slow and gentle. RCA Victor Red Seal records will "take to water" first. The new numbering system becomes effective with the May releases. Later, the numbering will be introduced to the Black Label and Bluebird records.

The new system will involve the use of six digits rather than the five digits and a letter which are now employed. The first two digits, which will indicate the classification, will be separated from the last four by a dash. For example, 10" Red Seal records, having a list price of 75 cents will be included in the Series starting with 10-0000. 12" Red Seal records, having a list price of $1.00 will be included in the Series beginning with 11-0000. 10" Black Label records, having a list price of 50 cents, will be included in the Series starting with 20-0000. 12" Black Label, having a list price of 75 cents, will be included in the Series starting with 28-0000. Bluebird records, having a list price of 35 cents, will be included in the Series starting with 30-0000, et cetera. Under this new system, it will be easy to assign special sub-classifications to recordings such as Export, U.S. Foreign, Old Familiar, Race, Mexican, and so on.

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SOUND HELPS RAILROADS DO GOOD TRANSPORT JOB

The American railroad system, hard-pressed under war emergencies, is being helped in its job of transporting men, war material, and the necessities of civilian life by a number of new sound installations made during the past few months by RCA. The new equipment is included in 184 sound installations reported for the period.

The Illinois Central is using sound to direct operations in one of its most important classification yards, and has installed complete radio and paging facilities on its new "Panama Limited." The Michigan Central is increasing the efficiency of its Detroit terminal by the use of a complete RCA sound installation. A comprehensive system has also been installed by the Chicago-Northwestern Railroad in its Chicago offices and yards, while the Pennsylvania is putting special sound equipment in 40 coaches.

Among the many important RCA sound installations completed during the period was listed a "military" mobile public address system placed at the Tank Destroyer School in Texas. This unit is mounted on a trailer which can be moved to any part of the camp where it may be needed for both instruction and entertainment. So successful has been the installation that the first unit has been enlarged and expanded in usefulness.

A southern shipyard is using RCA sound equipment to carry the ceremonies of launchings to all parts of the yard, so that employees can know what is happening without leaving their jobs. A second southern yard is using sound for communication between shore and ships being moved about from dock to dock during fitting operations. A measurable increase in efficiency has been noted. One western shipyard is enlarging its sound facilities with RCA equipment, while another in the same locality is putting in a system for the first time. Five other shipyards have also installed new RCA facilities.

Camp Crowder, Mo., is getting an unusual RCA sound system. It will consist of 140 loudspeakers for outdoor use, a number of other speakers for theatre, recreation hall and training buildings, portable pre-amplifiers, power amplifiers, input patching facilities, microphones, radios, phonographs, recorders, and remote line inputs. Programs can be originated at several points about the camp and transmitted to either the whole plant or to specific locations. Several programs may be handled simultaneously without interference.

Carillon concerts are a regular Sunday feature at the Michigan Naval Training School since the installation of an RCA carillon and auxiliary equipment.

The Will Rogers Air Field in Oklahoma City has been equipped with an RCA hanger paging system for use in instructing, paging and making routine announcements. The Post Theatre at Lowry Field, Denver, has been supplied with a complete RCA public address system.

The U. S. Navy Recruiting Station at Houston, Texas, now has a portable RCA public address system for use at meetings and lectures during recruiting drives.

Four of the country's most important aircraft factories have just installed new RCA sound systems, or have enlarged facilities in use for some time. A very large sound system has been installed at a mid-western ordnance plant to supply music during working hours.

During the two-month period, RCA sound systems were installed in 80 industrial plants and 37 government projects of varying types.

...'''...

To all young men aspiring to become engineers. Perhaps you have never considered what is involved in attaining your chosen profession. Here is the way the house organ of Wright Aeronautical Corporation describes it.

> "A person who passes as an exacting expert on the basis of being able to turn out with prolific fortitude infinite strings of incomprehensible formulae calculated with micromatic precision from

vague assumptions which are based on debatable figures taken from inconclusive experiments carried out with instruments of problematical accuracy by persons of doubtful reliability and questionable mentality for the avowed purpose of annoying and confounding a hopelessly chimerical group of fanatics referred to altogether too frequently as machine designers."

...'''...

The letter below was received in our Sales Department. We feel it may interest some of our readers.

"RCA Manufacturing Co., Inc.,
Camden, N. J.

Subject: AVR-100 Receivers
AVA-122 Loop
for aircraft

Gentlemen:

Having been an observer at a school I believe I can do a lot on your product. I am not employed at present and can show a ham call W----. I worked at a commercial airline who used Collins rigs.

Now don't get me wrong. I know George Malstead and the boy J. F. Rider. My first name is John too. I would like to get one of your mentioned receivers and loops to experiment on, not going into the manufacturing however as it takes money. If you have a set and loop you want to let me play with for duration it will be appreciated as hams are off the air now. I have rating 4-F, have worked in radio service shop. Have had surveying in small college NTAO a branch of Texas A & M. I am interested in that Corral Lombard crackup. "The pilot took the wrong course". Gentlemen don't get me wrong and you too George & John Rider. Where is my loop and receiver? Bendix is used at my old Company kinda hard to heat that is why I am thinking which is the better set.

Oh yea, some holler Bendix and others RCA. You remember ACR155 ham receiver and National HRO I guess. Well I am a slide rule toter myself. Any questions bothering you that you want me to think on, if you care to let me have them. Hold call W----. Taking telegraph now.

Send the loop and receiver if you care to, Rider, and maybe I can give you a pointer. Here is one now. You know Atwater Kent 60? It is laid out in perfect wiring and checking order. If your firm would do that on these little stew pipe specials the serviceman would get better results on your mistakes and you could sell more sets.

(2) On tubes, you don't follow a standard heater placement scheme. Put all heaters on bases the same as on type 24 tube one heater on each side of the pin. On some of yours you have heaters on one side of base only. It drives the serviceman nuts trying to fish a circuit out of one of those sets even with your big book "Rider's Manual", Chanalyst, Voltohmist, and whatnot. I am not a 4 year college graduate, gentlemen, just a "ham".

...'''...

On June 1 Dr. George H. Brown received from the University of Wisconsin the professional degree of Electrical Engineer. This degree is conferred upon graduates of the University of Wisconsin who have been graduated for at least ten years. In the case of Dr. Brown the Year Book stated that this degree was conferred on him for his contributions to the art through his work on antenna problems and radiation theory. We extend to Dr. Brown our sincere congratulations, knowing that he well deserves this honor.

...'''...

On June 19 Miss Cleo Louise Hardy became the wife of Mr. Frank P. Wipff (Research Laboratories). The ceremony took place in the Austin Park Christian Church of El Paso, Texas.

..''..

Mr. David P. Heacock (Junior Engineer at the Harrison plant - formerly employed in Camden) was married to Miss Kathryne Griggs on April 25, at Belleville, N. J.

...'''...

Congratulations to Mr. and Mrs. Perry C. Smith on the birth of a son, Perry C. Smith, Jr., on June 14, in the Cooper Hospital. Perry, Jr. weighed 7 lb. 12 oz. on arrival.

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TRANSFERS AND ADDITIONS

Camden

Additions

M. L. Greenough	Research
H. Myers	Research
Miss R. O'Brien	Research
R. R. Thalner	Research
P. H. Weimer	Research
J. G. Woodward	Research

Transfers

T. Collings	Model Shop to Research
G. Flury	Special Apparatus to Research
F. E. Greswold	Mfg. Methods to Research
P. Lockard	Model Shop to Research

Harrison

Additions

R. Nickles	Standardizing Section
R. E. Johnson	Cathode-Ray Engr. Section
A. W. Janes	Receiving Tube Engineering
A. R. Moore	Special Tube Engineering
D. F. Holshouser	Cathode-Ray Engineering
G. D. Hanchett	Receiving Tube Engineering
D. R. Yoder	Receiving Tube Engineering
R. C. Fortin	Receiving Tube Engineering
Robert Yoder	Receiving Tube Engineering
G. F. Smith	Special Purpose Tube Engr.
J. H. Germer	Development Shop
W. E. Lear	Life Test & Data Section
R. C. Wilcox	Cathode-Ray Engineering
H. M. Schwalbach	Development Shop
G. E. Gray	Power Tube Engineering
G. R. Feaster	Chemical Engineering
R. G. Stoudenheimer	Special Purpose Tube Engr.

Transfers

G. N. Phelps — Standardizing Section to Lancaster Organization

A. Bialecki — Chemical Engineering to Lancaster Organization

W. Kintner — Receiving Tube Engineering to Lancaster Organization

M. J. Carroll — Receiving Tube Engr. (Chicago) to Sales Dept.(Washington)

K. G. Bucklin — Receiving Tube Engr. to Product Manager of Receiving Tubes

Engineering Library News

ADDITIONS TO THE ENGINEERING LIBRARY

Camden

Technical Reports

TR-851 - Electromagnetic Fields in Tubes Smaller than the Critical Size, E. G. Linder - 2/26/42.

TR-852 - Heat Conduction Problems in Presses Used for Gluing of Wood, G. H. Brown - 3/12/42.

TR-853 - Production of Facsimile Scanner Reflectors by Plating, M. Solomon - 3/28/42.

TR-854 - Phosphate (granodine) Coatings on Iron Powder for Use in R-f Ferromagnetic Cores, C. Wentworth - 4/3/42.

TR-855 - Cut-off Frequency in Wave Guides, N. I. Korman - 5/21/42.

TR-856 - Automatic Frequency and Phase Control of Synchronization in Television Receivers, K. R. Wendt and G. L. Fredendall - 5/25/42.

TR-857 - A Simplified Permeability Tuned Short-Wave Spread-Band Auto Receiver, W. F. Sands - 6/22/42.

TR-858 - Reduction of Selective Fading Distortion by Diversity Reception at 710 Kc, W. L. Carlson - 7/6/42.

Engineering Memorandums

EM-2236 - The CA-26A Tuning Indicator Tube for FM Receivers, F. B. Stone - 2/23/42.

EM-2237 - Heat Treating Steel Strip by R-f, C. N. Hoyler and R. A. Bierwirth - 3/4/42.

EM-2238 - Distortion Due to FM in Loudspeakers Reproducing Complex Tones, H. Belar - 3/5/42.

EM-2239 - Power Feed Considerations in Rectifier Application, J. C. Walter - 3/12/42.

EM-2240 - Mechanic and Acoustic Constants of Material, H. F. Olson - 3/17/42.

EM-2241 - Rectifier Design Constants and their Derivation, J. C. Walter - 4/1/42.

EM-2242 - A Device to Measure the Tripping Action of Record Grooves, A. D. Burt - 4/28/42.

EM-2243 - An Oscillator Suitable for Remote Frequency Control, H. C. Lawrence - 5/7/42.

EM-2244 - Use of a New 9000 Series Tube as Crystal Oscillator and Frequency Multiplier in Fixed U-h-f Receivers, L. W. Haeseler - 5/6/42.

EM-2245 - Selectable, Variable Tuning or Crystal Controlled Spot Tuning of Oscillator Section of 6A7 Converter Tube , T. T. N. Bucher - 5/21/42.

EM-2410 - Indianapolis - Tube Circuit to Replace Transformers Between Balanced and Unbalanced Lines, H. I. Reiskind and A. Badmaieff - 2/14/42.

EM-2411 - Indianapolis - An Analysis of the Distortion Due to the Aperture Rotation Effect Arising from Folding of the Optical System in RCA Photophone Recorders, W. R. LePage - 4/11/42.

Radiotron Reports

LR-154 - Low Reflection Matching of Two Uniform Lines of Different Characteristic Impedances, L. P. Smith - 2/4/42.

LR-156 - Production of Iron Powder from Magnetic Iron Ore Fe_3O_4, E. Sindquist and L. R. Shardlow - 2/20/42.

LR-157 - U-h-f Practice (Lectures 16 and 17), E. W. Herold - 5/11/42.

Reprints

642 - Herold, E. W. - The Operation of Frequency Converters and Mixers for Superheterodyne Reception.

643 - Law, R. R. - Factors Governing Performance of electron Guns in Television C-5 Tubes.

644 - Salzberg, B. - Formulas for the Amplification Factor for Triodes - (I).

645 - Dimmick, G. L. - Improved Resolution in Sound Recording and Printing by the Use of Ultraviolet Light.

646 - Anderson, T. F. and Luria, S. E. - The Identification and Characterization of Bacteriophages with the Electron Microscope.

Translation

G-110 - Szalay, A. - The Destruction of High Polymer Molecules by Means of Supersonic Waves. Translated by Hans E. Paschon from the Institute for Medical Chemistry of the University Szeged, Hungary.

Books

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Coulthard, W. B. - Transients in Electric Circuits - Lond., Pitman, 1941.

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Kron, Gabriel - A Short Course in Tensor Analysis for Electrical Engineers - N.Y., Wiley, 1942.

Kuhlmann, John H. - Design of Electrical Apparatus (2nd ed.) - N.Y., Wiley, 1940.

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Mark, H. E. - Collected Papers of Wallace Hume Carothers on High Polymeric Substances - N.Y., Interscience, 1940.

Mark, H. - High Polymeric Reactions, Their Theory and Practice - N.Y., Interscience, 1941.

Mark, H. - Physical Chemistry of High Polymeric Systems - N.Y., Interscience, 1940.

Massa, Frank - Acoustic Design Charts - Phila., Blakiston, c1942.

Mason, W. P. - Electromechanical Transducers and Wave Filters - N.Y., Van Nostrand, 1942.

Mattiello, J. J. - Protective and Decorative Coating - N.Y., Wiley, 1942.

Mavis, F. T. - The Construction of Nomographic Charts. Scranton, Pa., Internatl. Textbook Co., 1939.

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Mott, N. F. - Electronic Processes in Ionic Crystals - Oxford, Clarendon, 1940.

Perry, Thomas D. - Modern Plywood - N.Y., Pitman, c1942.

Rapson, E. T. A. - Experimental Radio Engineering - London, Pitman, 1940.

Stratton, J. A. - Elliptic Cylinder and Spherioidal Wave Functions Including Tables of Separation Constants and Coefficients - N.Y., Wiley, c1941.

U.S. Dept. of Commerce - Trade and Professional Associations of the U. S. - Wash., Gov't Printing Office, 1942.

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W.P.A. - Tables of Sine, Cosine and Exponential Integrals. - Wash., D. C., Natl. Bur. of Stds., 1940.

W.P.A. - Table of Natural Logarithms - Wash., D. C., Natl. Bureau of Stds., 1941.

Harrison

LM-132 - Coatings on Kinescope Screens to Reduce Ion Spot, A. D. Power - 11/21/41.

LM-134 - Scum Formation on Chrome-iron Inserts During Etching, Vernon F. Miller - 1/2/42.

LM-135 - An Efficient R-f Oscillator Circuit for Operation of the Type 931 Multiplier Phototube, O. H. Schade - 1/17/42.

LM-136 - Flame Test with Coke and Carburetted Water Gas, C. A. Jacoby - 1/24/42.

LM-138 - Pumping Speed and Attainable Vacuum of Factory #3 Exhaust Machines, A. D. Power - 3/9/42.

LM-140 - Laboratory Demonstration, C. A. Jacoby - 4/30/42.

LM-141 - An Electronic Pulse Group Generating Circuit and Recorder for Measuring Persistence Screen Characteristics, O. H. Schade - 5/7/42.

LM-144 - Top Hooks in Radio Tubes, E. G. Widell - 6/4/42.

LR-148 - Time Lags in Gas Tubes, H. Wittenberg - 8/12/41.

LR-152 - Analysis and Design of Magnetic Scanning Circuits for Cathode Ray Tubes, O. H. Schade - 10/20/41.

LR-153 - The Absolute Sensitivity of Radio Receivers, D. O. North - 12/8/41.

LR-156 - Production of Iron Powder from Magnetic Iron Ore (Fe_3O_4), E. Kindquist and L. R. Shardlow - 2/20/42.

LR-157 - Lectures 16 and 17 - Ultra-high-frequency Practice, E. W. Herold - 5/11/42.

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Papers Approved for Presentation or Publication

Title	Author	
Camden		
The Electron Microscope and Its Application in Chemistry	V. K. Zworykin	Boston I.R.E. and American Chemical Society
Electron Microscopy	J. Hillier	Book "Advances in Bio-physics"
The Photographic Action of Electrons in the Range Between 40 and 212 Kilovolts	R. F. Baker, E. Ramberg & J. Hillier	Journal of Applied Physics
A One-Ray System for Designing Spherical Condensers	L. T. Sachtleben	S.M.P.E. Convention and Journal
The Focusing View Finder Problem in Television Cameras	G. L. Beers	S.M.P.E. Convention and I.R.E. Convention
The Observation of Crystalline Reflections in Electron Microscope Images	R. F. Baker & J. Hillier	Physical Review - Letter to the Editor
Recent Developments in Record Reproducing Systems	G. L. Beers & C. M. Sinnett	S.M.P.E. Convention and I.R.E. Convention
Frequency Modulation Distortion in Loudspeakers	G. L. Beers & H. Belar	S.M.P.E. Convention and I.R.E. Convention
Experience in Road Showing Walt Disney's Fantasia	W. E. Garity & W. Jones	S.M.P.E. Convention and Journal
A Study of Flicker in 16 Millimeter Picture Projection	E. E. Masterson & E. W. Kellogg	S.M.P.E. Convention and Journal
Improved Stable Power Supplies for Electron Microscopes	A. W. Vance	RCA Review
A Survey on Air Raid Alarm Signals	M. Graham and J. E. Volkmann	Acoustical Society Meeting
Variation of the Axial Aberration of Electron Lenses with Lens Strength	E. G. Ramberg	Journal of Applied Physics
Broadcast Transmitters	R. B. Bonney	International Corre-spondence Schools
An Oscillator Suitable for Remote Frequency Control	H. C. Lawrence	Electronics
A Diffraction Adapter for the Electron Microscope	J. Hillier, R. Baker & V. K. Zworykin	American Physical Society
Automatic Frequency and Phase Control of Synchron-ization in Television Receivers	K. R. Wendt & G. L. Fredendall	I.R.E. Convention
The Reduction of Record Noise by Pickup Design	A. D. Burt	RCA Review
A Scanning Electron Microscope	V. K. Zworykin, J. Hillier & R. L. Snyder	A.S.T.M. June Meetings
A Solution of the Problem of Adjusting Broadcast Directional Arrays with Towers of Unequal Heights	J. M. Baldwin & G. H. Brown	I.R.E. Convention
Radio-Telephone Transmitters	J. S. Leigh	International Corre-spondence Schools
Measuring Transcription Turntable Speed Variations	H. E. Roys	I.R.E. Convention
Harrison		
Formulas for the Amplification Factor for Triodes	B. Salzberg	Proceedings of the I.R.E.
Emission-Regulating Circuit for an Ionization Gauge	A. K. Wing, Jr. & R. B. Nelson	Review of Scientific Instruments
The Relative Sensitivities of Television Pick-up Tubes, Photographic Film, and the Human Eye	Albert Rose	Proceedings of the I.R.E.

Sealing Mica to Glass or Metal to Form a Vacuum-Tight Joint	J. S. Donal, Jr.	Review of Scientific Instruments
Luminescent Materials and Their Applications	H. W. Leverenz	Signal Corp and Army, Navy and Air Service
Crystal Planes Developed by D-C Heating of Tantalum	D. B. Langmuir	Physical Society Meeting
The Operation of Frequency Converters and Mixers for Superheterodyne Reception	E. W. Herold	Phila. Section of I.R.E.
Modern Cathode-Ray Tubes	L. B. Headrick	Section I.R.E. Meetings

New Tube Data

Technical information has been issued on the following tubes and is available in the Library.

Type	Description
829-A	Push-pull r-f beam power amplifier. An improved 829 permitting operation at higher plate voltages and with improved operation at u-h-f.
832-A	An improved 832 with changes like those described for the 829-A.
872-A/872	Half-wave mercury vapor rectifier combines characteristics of 872 and 872-A.
8008	Half-wave mercury vapor rectifier.
1644	Twin-pentode power amplifier (GT-Type).
5HP1	High-vacuum cathode-ray tube.
5HP4	High-vacuum cathode-ray tube.
9JP1/1809-P1	High-vacuum cathode-ray tube - 9" electrostatic-magnetic deflection medium persistence, green-phosphor-screen type.
1635	Class B twin amplifier.
1642	Twin-triode amplifier.
1A3	H-F diode (midget type).
1L4	H-F amplifier pentode (miniature type).
3A4	Power amplifier pentode (miniature type).
3A5	H-F twin triode (miniature type).
6C4	H-F power triode (miniature type).
9004	U-H-F diode (acorn type).
9005	U-H-F diode (acorn type).

Recently Issued Patents Assigned to RCA

Issued January 6, 1942

2,268,792 - Radio Receiver - E. F. Andrews.

2,269,300 - Radio Receiver - E. F. Andrews.

2,269,074 - Sound Recording System - C. N. Batsel.

2,269,245 - Motor - G. W. Blessing.

2,268,639 - Ultra-High-Frequency Radio Device - R. A. Braden.

2,268,640 - Rotary Beam Antenna - G. H. Brown.

2,268,643 - Frequency Modulation Distance Finder - M. G. Crosby.

2,269,417 - Cathode-driven Oscillator - M. G. Crosby.

2,268,811 - Television Receiver - D. J. Fewings and R. J. Kemp.

2,268,813 - Hum Reduction Carrier System - D. E. Foster.

2,268,812 - Program Distribution System - D. E. Foster and A. F. Van Dyck.

2,269,263 - Phonographic Apparatus - E. C. Guedon.

2,269,267 - Phonograph Record - J. H. Hunter.

2,268,752 - Sound Film Recording - E. W. Kellogg.

2,268,834 - Automatic Tuning Arrangement - J. Kuperus.

Re. 131,033 - Design for a Monoscope Electrode Plate - H. C. Moodey.

2,268,664 - All-wave Antenna System - V. D. Landon.

2,269,284 - Signal Translating Apparatus - H. F. Olson.

2,268,671 - Television Receiver - D. L. Plaistowe.

2,269,693 - Wide Range Amplifier Circuits - O. H. Schade.

2,269,694 - Uniform Response Wide-Band Amplifier - O. H. Schade.

2,270,012 - Distortion Reducing Circuits - F. H. Shepard, Jr.

2,269,605 - Socket - N. R. Smith.

2,269,559 - Telegraph Printing System - J. A. Spencer.

2,269,612 - Amplifying System - A. H. Turner.

2,270,176 - Radio Receiving Apparatus - J. A. van Lammeren, A. A. van Dam, L. L. Vivie and G. B. Knos.

Re. 22,000 - Visual Signal Carrier Indicator - E. I. Anderson.

Issued January 13, 1942

2,270,017 - Tuned Circuits - J. D. Brailsford.

2,269,654 - Video Amplifier - D. E. Foster.

2,269,528 - Manufacturing Metal Spheres - J. L. Gallup.

2,270,166 - Making Electrical Connections - J. N. Hiensch and E. M. H. Lips.

2,269,588 - Television Transmitting Tube - H. A. Iams.

2,270,130 - Directive Antenna System - E. A. Laport.

2,269,594 - Modulation of Wire and Radio Transmission by Frequency Variation - R. E. Mathes.

2,269,599 - Telantograph System - H. C. Moodey.

2,270,023 - Superheterodyne Receiver - J. F. Ramsay and A. L. Oliver.

Issued January 20, 1942

2,270,247 - Sound Recording System - C. N. Batsel.

2,270,260 - Production and Reproduction of Sound Records - C. M. Burrill.

2,270,261 - Production of Sound and Other Records - C. M. Burrill.

2,270,294 - Indicating Apparatus - W. S. Hall, Jr.

2,270,449 - Electrical Phase Shifting Device - A. Kahn.

2,270,337 - Electrical Contact Assembly - L. Pensak.

2,270,350 - Monitoring System for Sound Recording - M. T. Schomacker.

2,270,791 - Oscillator-Modulator Circuit - M. J. O. Strutt and A. van der Ziel.

2,270,367 - Electromechanical Control System - W. V. Wolfe.

Issued January 27, 1942

2,270,917 - Electrical Remote Control System - W. A. Appleton.

2,271,418 - Frequency-Changing Circuit - C. C. Eaglesfield.

2,271,186 - Short Dot Generator - J. L. Finch.

2,271,197 - Feedback Circuit Arrangement - O. E. Keall.

2,271,300 - Directive Antenna - N. E. Lindenblad.

2,270,965 - Ultra-High-Frequency Relay System.

Issued February 3, 1942

Re. 22,017 - Acoustic Device - J. Q. Gaubert and J. D. Seabert.

2,271,534 - Radio Receiver for Direction Finding or Course Indicating Systems - C. E. G. Bailey.

2,271,909 - Ultra-Short Wave Noise Eliminator - H. H. Beverage.

2,272,056 - Radio Course Indicator - W. L. Carlson.

2,271,517 - Radiogoniometer - C. S. Cockerell.

2,271,968 - Reversible Electric Motor - F. L. Creager.

2,272,060 - Ultra-High-Frequency Amplifier System - O. E. Dow.

2,272,062 - Coaxial Line Ultra High Frequency Amplifier - R. W. George.

2,272,050 - Control Apparatus for Signaling Apparatus - A. Horowitz.

2,271,976 - Phonograph Apparatus - H. J. Hasbrouck, Jr. and S. E. Bartelson.

2,271,980 - Recording of Alternating Current Impulses - E. W. Kellogg.

2,271,983 - Capacitor - W. D. La Rue.

2,271,522 - Receiver for Omnidirectional Beacons - D. G. C. Luck.

2,271,990 - Electron Microscope - G. A. Morton and E. G. Ramberg.

2,271,988 - Electroacoustical Apparatus - H. F. Olson.

2,272,066 - Ultra Short Wave System - H. O. Peterson.

2,271,985 - Electron Discharge Device - G. A. Morton.

2,272,052 - Tuning Indicator System - J. D. Reid.

2,271,716 - Electron Discharge Device - B. Salzberg.

2,271,525 - Loudspeaker - J. D. Seabert.

2,271,876 - Television Shading Control Circuit - S. W. Seeley.

2,271,721 - Transmitting a Plurality of Signals over the Same Channel - J. E. Smith.

2,271,519 - Neutralizing System - L. J. Wolf.

Issued February 10, 1942

2,272,288 - Insulator Mounting for Transmission Lines - L. A. Battermann.

2,272,795 - Photoelectric Sound Reproducer - G. L. Dimmick.

2,272,369 - Vacuum Tube Circuit - D. E. Foster.

2,272,869 - Electrode Manufacture - C. Herzog.

2,272,842 - Apparatus for Television Transmission and Reception.

2,272,843 - Electron Microscope Specimen Chamber - J. Hillier.

2,272,844 - Electron Discharge Device - J. L. H. Jonker.

2,272,849 - Voltage Indicating Device - T. B. Perkins.

2,272,851 - Electrical Oscillation Generator - J. F. Ramsay.

2,272,431 - Directional Antenna Orientation Control - J. A. Rankin.

2,272,821 - Telegraphone - H. E. Roys.

2,272,385 - Detector Circuit for Television Receivers - B. Salzberg.

2,272,312 - Radio Relaying - H. Tunick.

2,272,232 - Electron Beam Tube - H. M. Wagner.

Issued February 17, 1942

2,273,172 - Television System - G. L. Beers.

2,273,617 - Radio Receiver - C. J. Boers.

2,273,465 - Transmission Line Matching - P. S. Carter.

2,273,090 - Superregenerative Limiter - M. G. Crosby.

2,273,096 - Automatic Volume Control Circuit - D. E. Foster.

2,273,098 - Ultra-High-Frequency Receiver - D. E. Foster.

2,273,097 - Frequency Modulated Wave Receiver - D. E. Foster and J. A. Rankin.

2,273,637 - Phototube - A. M. Glover.

2,273,519 - Amplifier Circuit - J. Haantjes.

2,273,639 - Selectivity Control Circuit - J. Haantjes.

2,273,640 - Superheterodyne - J. Haantjes and B. D. H. Tellegen.

2,273,107 - Automatic Gain Control Circuit - E. W. Herold.

2,273,522 - Adjustable Slidable-electrode Condenser - A. Horowitz and H. Rinia.

2,273,771 - Frequency Modulated Carrier Detector - S. Hunt.

2,273,110 - Frequency Modulated Wave Receiver - C. N. Kimball and G. C. Sziklai.

2,273,801 - Television Receiver - D. O. Landis.

2,273,132 - Automatic Gain Control System - J. B. Moore.

2,273,134 - Dual Intermediate Frequency Amplifier Circuit - G. Mountjoy.

2,273,656 - Amplifier Control Circuits - E. Osterhuis.

2,273,142 - Visual Tuning Indicator - W. van B. Roberts.

2,273,143 - Audio Volume Control Circuit - W. van B. Roberts.

2,273,144 - Frequency Modulation Detector - W. van B. Roberts.

2,273,161 - Polarized Wave Modulation by Phase Variation - G. L. Usselman.

2,273,673 - Volume Control Circuit - C. J. van Loon.

2,273,546 - Receiving System - A. Van Weel.

2,273,680 - Amplifier Control Circuit - H. T. J. Wiegerinck.

Issued February 24, 1942

2,274,466 - Temperature Compensated Crystal Holder - J. B. Atwood.

2,274,529 - Sound Film Recording Apparatus - M. E. Collins.

2,274,546 - Radio Compass - E. H. Hugenholtz.

2,274,486 - Piezoelectric Resonator Circuit - W. R. Koch.

2,274,271 - Transmitting System - E. A. Laport.

2,274,272 - Luminescent Material - H. W. Leverenz.

2,274,347 - Negative Resistance Circuit Arrangement.

2,274,098 - Deflecting Circuit - Henry Shore.

2,274,505 - Controlled Transmission Circuit - Kurt Singer.

2,274,103 - Telegraph Printing System - J. A. Spencer.

2,273,911 - System of radio communication by means of polarization modulation - G. A. Usselman.

2,274,262 - Air Speed Indicator - I. Wolff.

2,274,530 - Automatic Light Intensity Control for Sound Apparatus - M. E. Collins.

Issued March 3, 1942

2,275,026 - Television System - Alda V. Bedford.

2,275,027 - Electron Discharge Tube and Circuits Therefor - David A. Bell.

2,275,342 - High Frequency Antenna - George H. Brown.

2,275,342 - Indexing Means - Wendell L. Carlson.

2,275,028 - Television Receiver - K. A.

Chittick and R. C. Ballard.

2,275,286 - Indexing Mechanism - F. L. Creager.

2,275,287 - Carrier Controlled Modulator - M. G. Crosby.

2,275,252 - Electrical Musical Instrument for Producing Bell Tones - G. W. Demuth.

2,275,029 - Cathode Ray Tube - D. W. Epstein.

2,275,030 - Turnstile Antenna - J. Epstein.

2,275,254 - Directional Radio Transmitting and Receiving System - S. W. H. W. Falloon.

2,275,256 - Piezometer - Joseph A. Fried.

2,274,829 - Elimination of Spurious Additions to Radio Signals - DeWitt R. Goddard.

2,275,298 - Radio Course Indicator - Eduard Hugenholtz.

2,274,926 - Speed Regulator for Electric Motors - William Kimmich.

2,275,016 - Control System - W. R. Koch.

2,274,841 - Photo Radio System - R. E. Mathes and W. H. Bliss.

2,275,234 - Electron Diffraction Camera - J. E. Ruedy.

2,274,911 - Kirect Keyboard Transmitter - J. A. Spencer.

Issued March 10, 1942

2,275,940 - Alarm system - C. H. Backus and A. M. Donato.

2,275,898 - Microfacsimile System - A. N. Goldsmith.

2,275,635 - High Voltage Generator - N. E. Lindenblad.

2,275,974 - Sweep Circuit for Cathode Ray Tube Distributors.

2,275,646 - Antenna - H. O. Peterson.

2,276,106 - Welding Cathode Sleeves - W. Sidney.

Issued March 17, 1942

2,276,455 - Cathode Ray Tube Apparatus - G. L. Beers.

2,276,459 - Phonographic Apparatus - R. F. Brady.

2,276,565 - Limiting Amplifier - M. G. Crosby.

2,276,470 - Self-holding screw driver - E. A. Dodelin.

2,276,482 - Wide Band Amplifier - G. A. Grundmann.

2,276,966 - Gasoline Engine Ignition System - C. W. Hansell.

2,276,724 - Radio Receiver - A. Horowitz and P. H. Fennema.

2,276,304 - Composition of matter - J. H. Hunter.

2,276,494 - Web Feeding Apparatus - E. W. Kellogg.

2,276,497 - Ultra-High Frequency Antenna Feedback Balancer - F. H. Kroger.

2,276,320 - Centimeter Wave Device - E. G. Linder.

2,276,504 - Indicator - H. Mendelson.

2,276,672 - Frequency Modulation Indicator - W. van B. Roberts.

Issued March 24, 1942

2,277,638 - Ultra-High-Frequency System - R. W. George.

2,277,499 - Transformer - J. C. D. Missell.

2,277,261 - System for Transmission and Reception of Frequency Modulated Signals - J. E. Smith, James N. Whitaker and G. R. Clark.

Issued March 31, 1942

2,277,841 - Superregenerative Magnetron Receiver - R. A. Braden.

2,277,955 - Radio Transmitter - C. Cockerell and G. P. Parker.

2,277,905 - Phase Indicator - W. S. Eaton.

2,278,130 - Automatic Lighter and Display Devices - H. E. Goldstine.

2,278,371 - High Frequency Switch - R. F. Guy.

2,277,863 - Electron Discharge Device and Circuit - E. W. Herold.

2,278,278 - Metal Envelope Radio Tube - J. F. Miller.

2,277,871 - Hermetic Seal - L. E. Mitchell and A. J. Vasselli.

2,278,093 - Crystal Holder - H. O. Peterson and P. V. Winans.

2,277,906 - Phase Indicator - W. S. Eaton.

Issued April 7, 1942

2,278,641 - Electronic Commutator - D. S. Bond.

2,278,686 - Radio Frequency Wattmeter - G. H. Brown and J. Epstein.

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2,279,201 - Directional Receiver - P. G. Cooper and C. D. Tuska.

2,279,031 - Radio Navigation Aid - C. S. Cockerell and J. G. Robb.

2,278,429 - Reactance tube Modulation - M. G. Crosby.

2,278,779 - Reducing Multipath Effects - C. W. Hansell.

2,279,275 - Noise Suppression Circuit - L. Kamenarovic.

2,278,658 - Frequency Modulation - F. H. Kroger.

2,278,620 - Harmonic Attenuation Filter - O. S. Meixell.

2,279,007 - Time Delay Circuit and Relaxation Oscillator - W. S. Mortley.

2,278,668 - Demodulation of Frequency Modulated Oscillations - R. G. Piety.

2,279,056 - High-Frequency Grid Modulator - D. Pollack.

2,279,058 - Detector for Frequency Modulation Signals - J. D. Reid.

2,278,801 - Band Pass Filter - N. M. Rust, J. D. Brailsford and E. F. Goodenough.

2,278,500 - Vacuum Tube Seal-off - N. R. Smith.

2,279,185 - Receiver Circuits - Tellegen, B. D. H.

2,279,030 - Frequency Modulation - E. S. Winlund.

2,279,018 - Sound Recording Method and System - W. V. Wolfe.

Issued April 14, 1942

2,280,026 - Ultra-Short Wave System - G. H. Brown.

2,279,659 - Frequency Modulator - M. G. Crosby.

2,279,660 - Wave Length Modulation System - M. G. Crosby.

2,279,661 - Wave Control and Control Circuit - M. G. Crosby.

2,279,316 - Welding Machine - C. Herzog.

2,279,506 - Frequency Modulation Signal Detector - J. D. Reid.

2,279,930 - Electronic Modulator for Constant Frequency Variable Dot Transmission - R. E. Shelby.

Issued April 21, 1942

2,280,737 - Reversible Motion Picture Camera - J. R. Alberger.

2,280,740 - Sound Recording Apparatus - H. Belar.

2,280,685 - Phonograph - B. R. Carson.

2,280,282 - Electrical Coupling Circuits - C. D. Colchester and A. T. Starr.

2,280,569 - Frequency Modulation Receiver - M. G. Crosby.

2,280,693 - Apparatus and Method of Modulating Waves - J. Evans.

2,280,521 - Radio Receiver - D. E. Foster.

2,280,695 - Television Circuits - D. E. Foster.

2,280,228 - Electron Beam Discharge Device - A. M. Glover.

2,280,763 - Phonographic Apparatus - H. J. Hasbrouck, Jr.

2,280,525 - Frequency Modulated Wave Detector - S. Hunt.

2,280,707 - Apparatus for and Method of Frequency Modulating - R. D. Kell.

2,280,527 - Oscillator Drift Compensation Devices - C. N. Kimball.

2,280,530 - Frequency Modulated Wave Detector - G. Mountjoy.

2,280,605 - Piezo-electric Crystal Filter Circuit - W. van B. Roberts.

2,280,606 - Electronic Reactance Circuits - W. van B. Roberts.

2,280,545 - Diode Phase Detector - R. E. Schock.

2,280,725 - Self-Balancing Capacity Altimeter - F. H. Shepard, Jr.

2,280,728 - Telescoping High Frequency Electrical Conductor - A. Streib.

2,280,733 - Deflecting Circuits - W. A. Tolson.

2,280,562 - Tunable Nondirective Loop Circuits - R. A. Weagant.

2,280,563 - Automatic Selectivity Control Circuit - J. Weinberger.

2,280,570 - Variable Band Width Receiver - M. G. Crosby.

2,280,607 - Frequency Modulation Receiver Tuning Indicator - W. van B. Roberts.

Issued April 28, 1942

2,280,901 - Illumination Device - W. C. Eddy.

2,281,147 - Variable Condenser - R. E. Franklin and E. D. Thorne.

2,281,429 - Antenna - D. R. Goddard.

2,280,822 - Frequency Modulated Radio Relaying System - C. W. Hansell.

2,281,196 - Radio Relay Repeater - N. E. Lindenblad.

2,281,247 - Ultra-Short-Wave Radio Circuit - H. O. Peterson.

2,280,978 - Negative Transconductance Device - W. van B. Roberts.

2,281,205 - Voltage Variation Compensator - R. E. Schock.

2,281,468 - Wireless Receiver - J. A. VanLammeren.

Issued May 5, 1942

2,281,661 - Tuning System - L. E. Barton.

2,281,665 - Phonographic Apparatus - R. F. Brady.

2,282,113 - Band-pass Filter - Brailsford, J. D.

2,281,668 - Apparatus and Method for Adjusting Transmitting Antennas - G. H. Brown.

2,282,046 - Multiplex Signaling System, A. N. Goldsmith.

2,282,295 - Oscillation Generation and Control - C. W. Hansell.

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