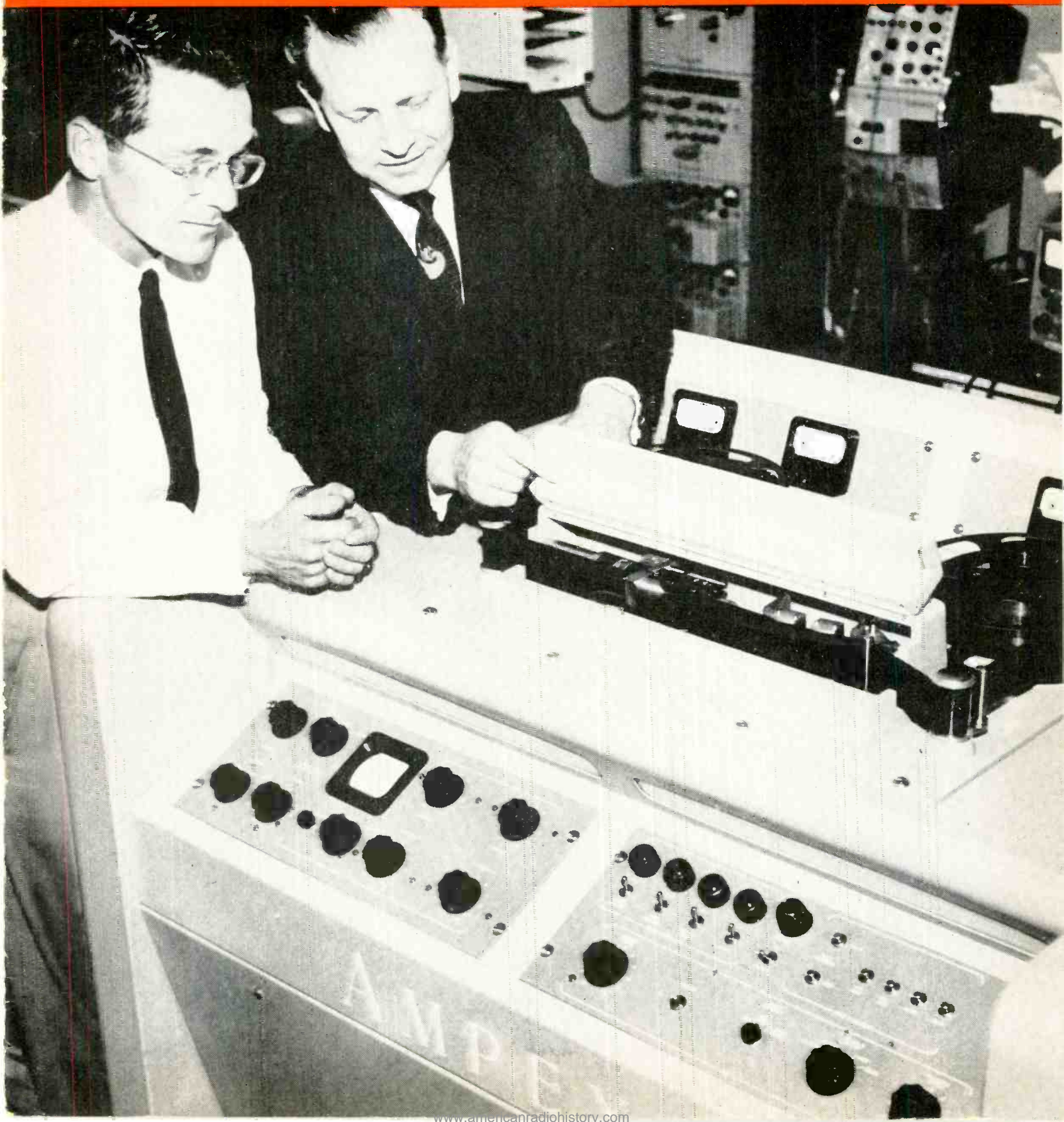


RADIO, TV and RECORDING

# TECHNICIAN-ENGINEER



APRIL, 1956



RADIO, TV and RECORDING  
**TECHNICIAN-  
ENGINEER**

VOLUME 5 17 37 NUMBER 4

PRINTED ON UNION MADE PAPER

The INTERNATIONAL BROTHERHOOD of ELECTRICAL WORKERS

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**. . . in this issue**

<i>Video Tape Recorder Perfected</i> . . . . .	3
<i>Remote Control F. C. C. Hearing</i> . . . . .	5
<i>Progress Meeting</i> . . . . .	7
<i>Reading Time</i> . . . . .	8
<i>West Coast Projection Room</i> . . . . .	9
<i>The Sunspots Are Back</i> . . . . .	10
<i>Electron Tube Information Service</i> . . . . .	11
<i>TV in Spillway Construction</i> . . . . .	13
<i>Technical Notes</i> . . . . .	14
<i>Station Breaks</i> . . . . .	16

**. . . the cover**

Charles P. Ginsburg, senior project engineer in charge of video development, and Phillip L. Gundy, manager of the audio division, responsible for the new project described on pages 3 and 4, inspect the magnetic head assembly in Ampex Corporation's new television tape recorder.

**commentary**

While the nation is busy watching the developments in national politics, highly-paid lobbyists and propagandists are quietly moving into the state capitals across the nation in an unprecedented move to enact more "right-to-work" legislation to curb the activities of unionists.

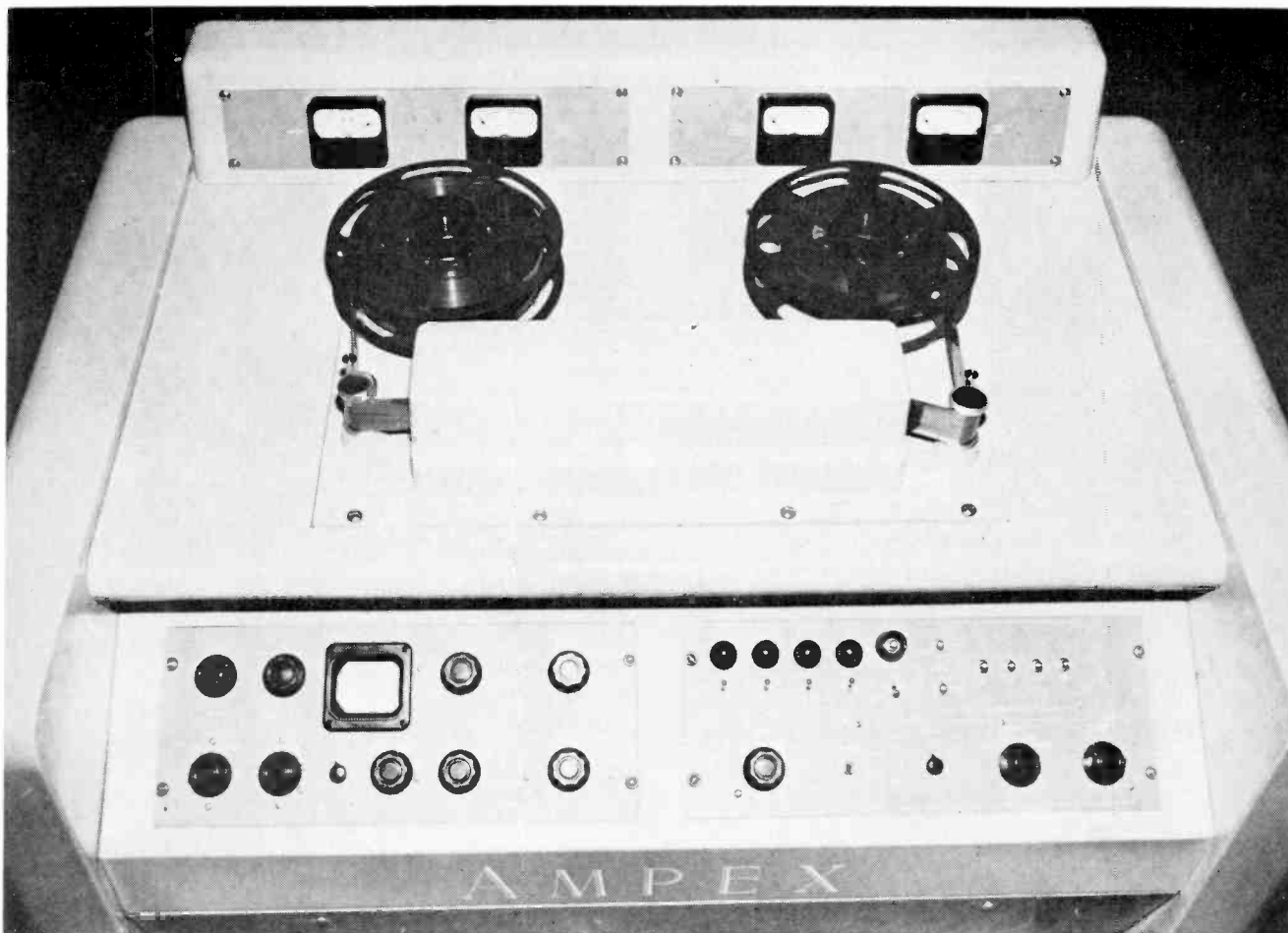
Actually, labor faces a battle in no less than 30 states this year. In each of these states the "right-to-wreck organized labor" statutes will likely be introduced with little fanfare so that the voters' attention won't be attracted to the law. It is labor's job to see that these laws do not slide through without a dramatic fight.

Some of the proponents of these bills are taking advantage of the popularity of President Eisenhower by trying to see that anti-labor "coat tail riders" are nominated for state legislatures on the ticket with the President. In this way, even if the laws should fail this year, chances for enactment next year will, in their minds, be "good."

These bills are pending in Kentucky, Maryland, Massachusetts, Michigan and California. A reactionary group in Washington state is trying to collect 50,000 signatures on a petition to place such a bill on the general election ballot. This group has mailed 800,000 petitions in an effort to collect the needed signatures.

What about *your* state? Are *you* prepared to meet this challenge if it should come? Remember, the job you save may be *your own*!

Published monthly by the International Brotherhood of Electrical Workers, AFL-CIO, 1200 Fifteenth St., N. W., Washington, D. C., for the men and women in the recording, radio and television industries. Entered February 20, 1952, as second-class matter at Washington, D. C., under Act of August 24, 1912. Subscription Price: U. S. and Canada, \$2 per year, in advance.



A top view of the Ampex Corporation's recently developed magnetic tape recorder for television programs. The unit will record both pictures and sound for a full hour's program on a reel of magnetic tape two inches wide and 14 inches in diameter. Despite the number of controls, recordings are made by pushing only one button.

# Video Tape Recorder Perfected

## *Ampex Announces TV Recording Equipment*

**O**N APRIL 14, Ampex Corporation, one of the world's leading manufacturers of professional and home magnetic recorders, demonstrated a revolutionary new process for the recording and reproduction of television programs on magnetic tape. Simultaneous demonstrations were held in Chicago by George I. Long, Ampex president, and in one of the engineering laboratories at Redwood City by A. M. Poniatoff, chairman of the board of directors.

At the Chicago meeting, held in conjunction with the annual meeting of more than 200 CBS television network affiliate officials, it was announced that CBS television has placed an order for the first three prototype units. Delivery to

CBS will be completed by late summer, according to Phillip L. Gundy, manager of Ampex's Audio Division, responsible for the development. He pointed out that these Ampex Video Recorders will operate at only 15 inches per second, providing for a full hour television program to be recorded and reproduced on 14-inch reels of two-inch magnetic tape.

Engineering Vice President of CBS Television William B. Lodge said: "CBS television is extremely happy that it is scheduled to be the first television network to receive Ampex Video Tape Recorders. We hope that use of this new equipment to overcome the three-hour East-West time differential will improve the technical quality of



CBS television programs and will enable our affiliated stations on the West Coast to deliver better quality pictures in the home."

The introduction of video tape recording marks the second time that Ampex, a leader in the field of quality tape recorders, has scored a first in the broadcast industry. In 1948 Ampex placed the first magnetic tape sound recorders in regular use by broadcasting networks. Since that time, the use of tape recording has revolutionized broadcast industry operating techniques and economics. The impact and potential of the Ampex Video Tape Recorder on the television industry is even more significant to the economy and growth of television.

**T**HE new Ampex VTR (video tape recorder) system records both picture and sound on a single magnetic tape two inches wide. Picture quality is considerably better than that obtained with current kinescope techniques using photographic film, according to Charles P. Ginsburg, senior project engineer in charge of video development. The "gray scale"—the ability to reproduce accurately all shades from black to white, is inherent in this new video magnetic tape recording system. On the other hand, the gradient from black to white is not uniform in photographic film.

Resolution—the measure of the clarity of the picture—is far beyond the capability of the average television receiver. Thus, when a tape recorded program is telecast, the limitation of picture quality will be in the home receiver rather than in the quality of transmission.

Resolution is measured by the number of lines into which a television screen is divided, the greater the number of lines (the finer the lines) the more detail appears in the picture. Horizontal resolution is a variable depending on many factors, most limiting of which is the television receiver. An average home receiver has a horizontal resolution of approximately 275 lines across the face of the picture tube. The maximum number of lines which a station can transmit is 340. The Ampex Video Tape Recorder will record and reproduce more than 320 lines.

Perhaps even more important than the reproduction of recorded programs with "live" telecast quality are the operational and economic advantages the Ampex Video Tape Recorder offers the television industry. Programs can be recorded directly from the TV camera, from a TV receiver, from television transmission lines or from microwave relay systems. Just as with audio tape recorders, the program can be immediately replayed with no processing of any kind necessary. Considerable economy can be effected by erasing the

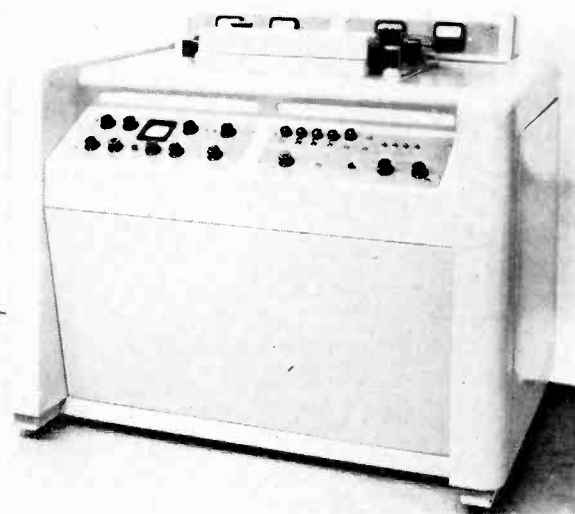
recorded signal when it is not longer needed and re-using the tape to record another program. This is in contrast to photographic film which cannot be reused after it has once been exposed.

Once the equipment has been installed and adjusted, operation is as simple as that of an audio tape recorder. To record a program, the operator presses one button to start recording. To play a recorded program, he simply presses the playback button.

The machine operates on the same basic principles employed in a regular Ampex audio tape recorder. Electrical signals are passed through a coil around an electro-magnet known as the recording head. The strength of the magnetic field in the recording head at any time depends on the electrical current in the coil at the given instant. In turn, the magnetic field impresses a pattern on the magnetic surface of the tape as it passes the recording head. The pattern on the tape, therefore, corresponds to the electrical signals in the coil on the recording head. Since the electrical signals are generated by the TV camera, the pattern on the tape corresponds to what the camera "sees" at any given instant.

To reproduce the picture, the tape is passed across the same magnetic head. The magnetic pattern on the tape induces a current in the coil around the head. Since the pattern corresponds to the original picture, the induced current can be fed to a television transmitter just as though it were coming directly from the TV camera.

To obtain the resolution of 320 lines, Ampex's  
*Continued on Page 8*



A revolutionary concept in the recording of television programs is embodied in the video magnetic tape recorder recently introduced by the Ampex Corporation. Shown above, the unit, only slightly larger than an office desk, is capable of recording a full hour's television program on a single reel of magnetic tape.

# FCC Issues Public Notice

In the March issue of the *TECHNICIAN-ENGINEER* we told (Page 3) of the latest attempt by the National Association of Radio and Television Broadcasters to obtain rule relaxation regarding remote operations in broadcasting. Here is the FCC's resulting notice.

Before the  
FEDERAL COMMUNICATIONS COMMISSION  
Washington 25, D. C.

*In the matter of amendment of Sections 3.66, 3.274, and 3.572 of the Commission's Rules and Regulations relating to remote control operation of certain standard, FM and non-commercial educational FM broadcast stations.*

## NOTICE OF PROPOSED RULE MAKING

1. Notice is hereby given that the Commission has received a proposal for rule making in the above-entitled matter.

2. The Commission has before it a petition filed on February 15, 1956, by the National Association of Radio and Television Broadcasters (NARTB), Washington, D. C., requesting amendment of Sections 3.66 (AM), 3.274 (FM) and 3.572 (non-commercial educational FM) of the Rules and Regulations to authorize the remote control operation of all standard and FM broadcast stations, including those authorized to operate with directional antenna systems or with powers in excess of 10 kilowatts.

3. Present regulations, adopted in a Report and Order (FCC 53-68) released on January 27, 1953, in Docket No. 10214, permit remote operation, subject to certain conditions, only by Standard non-directional and FM broadcast stations authorized to operate with powers not in excess of 10 kilowatts. In finalizing the present rules we stated in the above Report and Order that the most important consideration was whether the revision of the rules to permit remote control operation would result in any degradation of the Commission's technical standards. We concluded in that proceeding, after consideration of over 2,000 comments, that, in light of the status of the equipment needed for remote control operation, the experimental demonstration of the feasibility of such operations, the conditions imposed upon remote control operation, and the salutary purposes to be accomplished by its use in appropriate situations, the authorization of remote control, if limited to standard non-directional and FM stations, operating with power of 10 kw or less, would not result in any degradation of our technical

standards and was desirable. We reaffirmed this decision in a Memorandum Opinion and Order (FCC 53-355) released March 30, 1953, denying a petition for reconsideration of our January Report and Order. We again found that our rules authorizing remote control operation were in the public interest and that the question of whether the amendments permitting remote control operation would result in any degradation of our technical standards must be decided in the negative. We also pointed out that the authorization of remote control was only extended to stations authorized for non-directional operation with powers up to 10 kilowatts because of "our experience with problems arising with the utilization of very high power equipment and the showings made in this proceeding" and because we "felt that the relaxation should extend to that level of power at which no serious problems would be encountered because of the nature of the transmitting equipment itself."

4. In support of the requested amendments, the NARTB urges that the Commission considered and disposed of all objections to remote control operations in adopting the present rules relating to remote control operations; that the Commission's conclusions in the 1953 rule making proceeding are equally applicable to the Association's instant proposal for further relaxation of the rules; and that the only issue to be decided in determining whether its proposed amendments should be adopted is the question of whether a further relaxation of the rules would in any way result in a degradation of the Commission's technical standards. NARTB claims that the limitations in the present remote control rules were adopted solely because of the lack of technical proof that equipment of a higher power could operate without a degradation of the technical standards and urges that the engineering data furnished with its petition demonstrates that present remote control operations of all types indicate a high degree of reliability and that the experimental data submitted clearly demonstrates that remote control operation may be extended to stations utilizing directional antenna systems and high power with the assurance that equal reliability will be achieved. The Association alleges in its exhibits that the outage time of 198 stations now authorized for remote control operations amounted to only 0.04 per cent of a total "on-air" figure of 630,790.5 hours reported, which it claims is less than one-third the amount for stations operating without remote control prior to 1953. It alleges that this figure shows that the Commission was right in its conclusion in 1953 that remote control oper-

ations would not result in excess outages and that it clearly demonstrates that transmitting equipment and remote control equipment have reached a high state of development. It urges that it is the consensus of a group of professional radio engineers who have studied remote control problems that remote operation of standard and FM broadcast stations, utilizing directional antenna systems and operating with powers up to and including 50 kilowatts, is feasible and should be authorized; that their opinion is confirmed by the data obtained from experimental remote operation of American stations with directional antenna systems and high power, from unattended operation of remote stations owned by the British Broadcasting Corporation, from unattended directional operation of radio range stations of the Civil Aeronautics Authority and from unattended directional operation of Canadian broadcast stations.

5. The Association also discusses the effect of its proposals upon the CONELRAD plan. It points out that the Commission likewise considered this matter before adopting the present rules; that it specifically determined that the operations necessary to place a station in CONELRAD operation could be accomplished by remote control and that it recognized that in the case of remote control, the expenses involved to effect such a switch might deter voluntary CONELRAD activity. The NARTB states that it also is vitally interested in the continued success of the CONELRAD plan and is concerned about the possibility that its proposals for relaxing the remote control operation rules might affect the CONELRAD operating stations not now authorized for remote control, even though it believes there is no real cause for concern. It proposes, however, that, in order to insure the continued effectiveness of CONELRAD, any further remote control authorization to a standard broadcast station, whether or not now participating in the CONELRAD operating system, be conditioned upon the station's equipping itself to be able to satisfactorily operate in the system and by remote switching of the transmitter or by using a separate transmitter change from its assigned frequency to the CONELRAD frequency specified by the Commission. It is pointed out, however, that this proposed rule would only require the installation of equipment capable of accomplishing this operation and that the actual participation in the operating system would remain on a voluntary basis. The Association urges that such a requirement will make it possible for stations to shift from their normal frequency to the CONELRAD frequency in a very brief period of time. The NARTB concludes that adoption of its proposed amendments will bring the remote control rules in conformity with the present state of the development of transmitting and remote control equipment; that it will relieve broadcasters from unnecessary limitations upon their ability to serve the public interest, convenience and necessity, and that it will provide an effective method of operation by the CONELRAD stations and insure the effectiveness of the system by providing for a sufficient number of stations equipped to participate in the operating system.

6. The Association proposes that the AM and FM

rules relating to remote control operation be amended as follows:

#### 1. Section 3.66—Remote Control Operation (Standard Broadcast Stations)

a. Delete from Section 3.66(a) the phrase "which is authorized for non-directional operation with power of 10 kilowatts or less."

b. Add a new subsection, Section 3.66(b), to read:

"(b) In addition to the conditions set out in Section 3.66(a), a station, which is authorized to operate with a directional antenna, may be operated by remote control subject to the following conditions:

"(1) Equipment shall be installed so that the base currents of each element of the antenna system and the common point current may be read at the remote control point and logged at least once each hour.

"(2) A spare antenna base current meter, which complies with the requirements of Section 3.39, shall be available and such meter shall be checked against the regular meter to insure that the error over the usable portion of the scale does not exceed 2 per cent of the full scale value."

c. Add a new subsection, Section 3.66(c), to read:

"(c) In addition to the conditions set out in Section 3.66(a), a station, which is authorized for non-directional operation with power in excess of 10 kilowatts, may be operated by remote control subject to the condition that equipment shall be installed so that the base current of the antenna, or that current which is consistent with the Commission's rules, may be read at the remote control point and logged at least once each hour."

d. Add a new subsection, Section 3.66(d), to read:

"(d) A station, which is authorized to operate with a directional antenna or with power in excess of 10 kilowatts, may be operated by remote control only if equipped so that it can be operated on the CONELRAD frequency assigned and the necessary switching from the station's assigned frequency to the CONELRAD frequency can be accomplished from the remote control position."

#### 2. Section 3.274—Remote Control Operation (FM Broadcast Stations)

Delete from Section 3.274 the phrase "which is authorized with transmitter power output of 10 kilowatts or less."

#### 3. Section 3.572—Remote Control Operations (Non-commercial Educational FM Broadcast Stations)

Delete from Section 3.572 the phrase "which is authorized with transmitter power output of 10 kilowatts or less."

7. The Commission is of the view that rule making proceedings should be instituted on the proposed amendments of the NARTB in order that interested parties may submit their views and the Commission may have the benefit of such views prior to taking further action.

8. The Commission desires that parties filing comments in this proceeding direct their attention to the following questions raised by petitioner's proposal:

1) Whether every six months during the first three years that remote control is authorized, the Commission should require submission of a skeleton proof of performance to show that the antenna system meets the terms of the license, and thereafter the submission of a skeleton proof with each license renewal application;

2) Whether the Commission should require the logging of loop current ratios rather than base current ratios and how often readings should be made and logged;

3) Whether and how often the Commission should require the logging of phase relations;

4) Whether and to what extent any of the information required to be logged by present or proposed regulations may be logged by automatic recording devices;

5) Whether and to what extent the Commission should modify the requirements with respect to remote antenna meters, particularly with respect to scale and units in which they are required to be calibrated;

6) Whether the Commission should require that remote equipment be capable of providing simultaneous readings of frequency, of modulation and of antenna current at the control point as currently provided by the rules.

7) Whether the Commission should require the installation of equipment that will shut down the transmitter when it fails to function within the tolerances prescribed by Commission rules.

8) Whether and how often remote meters should be calibrated, and whether such calibration curves should be posted at the control point.

9. Parties filing comments should also direct their attention to whether, in the event the proposed amendments are adopted, each proposal for remote operation with a directional antenna should be accompanied by a sworn statement, by a competent engineer, describing the operational stability of the array, and which should also include the following:

(1) Weekly monitoring point readings for one year prior to the submission of the data.

(2) Daily base current ratios, loop current ratios, phase relations and common point current readings for a period of 30 days, commencing not more than 60 days prior to the submission of the data. The data should be accompanied by information respecting adjustments of phasing and other tuning of the transmitter and associated equipment it was found necessary to perform in this period.

(3) (a) A complete proof of performance on the directional antenna system if no such proof has been

submitted to the Commission within five years from the date of application for remote control operation.

(b) A skeleton proof of performance (a minimum of three field intensity measurements including the monitoring point reading on each radial) on the directional antenna system if no complete proof of performance has been submitted to the Commission within two years from the date of application for remote control.

10. NARTB proposes that a station authorized to operate with directional antenna or with power in excess of 10 kw may operate by remote control only if equipped so that it can be operated on the CONELRAD frequency assigned and the necessary switching from the station's frequency to the CONELRAD frequency can be accomplished from the remote control position. The Commission desires that comments also be directed to whether the Commission should require *all* future remote control authorizations, regardless of power, to be conditioned upon the installation of equipment that will permit satisfactory operation on the CONELRAD frequency assigned and the necessary switching from the station's assigned frequency to the CONELRAD frequency.

11. Authority for the adoption of the proposed amendments is contained in Sections 4(i), 303(b), 303(e), 303(g) and 303(r) of the Communications Act of 1934, as amended.

12. Any interested person who is of the view that the proposal should not be adopted, or should not be adopted in the form set forth herein, may file with the Commission on or before June 1, 1956, written data, views, or arguments setting forth his comments. Comments in support of the proposal may also be filed on or before the same date. Comments or briefs in reply to such original comments as may be submitted should be filed within 20 days from the last day for filing said original comments or briefs. No additional comments may be filed unless (1) specifically requested by the Commission or (2) good cause for filing such additional comments is established. The Commission will consider all such additional comments submitted before taking further action in this matter, and if any comments appear to warrant the holding of a hearing, oral argument, or demonstration, notice of the time and place of such hearing, oral argument or demonstration will be given.

13. In accordance with the provisions of Section 1.764 of the Commission's Rules and Regulations, an original and 14 copies of all statements, briefs or comments shall be furnished the Commission.

#### FEDERAL COMMUNICATIONS COMMISSION

MARY JANE MORRIS, *Secretary*

Adopted: April 11, 1956

Released: April 12, 1956

The International Brotherhood of Electrical Workers is preparing an argument to the NARTB position. We shall report further on the matter in our May and June issues.

# READING TIME

**Attenuators, Equalizers, and Filters** by Drs. George K. Tefteau and Howard T. Tremaine, Howard W. Sams & Co., Inc., 2201 East 46th Street, Indianapolis 5, Ind. Paper bound edition, \$2.75; Deluxe hard bound edition, \$4.00.

This new audio book describes the design, application, and theory of operation of every type of Attenuator, Equalizer, and Wave Filter. Covers all types of equalization and attenuation used in audio recording and reproducing systems, both professional and home type. Of special interest to audio enthusiasts is a chapter on hi-fi crossover networks. Also included are timesaving charts which permit the easy determination of component values required in designing equalizers and filters.

Dr. Tremaine, Sc. D, Fellow A.E.S., is chief of the Sound Division, USAF Lookout Mt. Laboratory, Hollywood, Calif. He has over 25 years experience in motion picture sound recording work and has been active in the development of special motion picture sound tracks.

Dr. Tefteau, J.D., Litt.D., is the Engineering Publication Editor of Airresearch Manufacturing Company of Arizona in Phoenix.

These men are well qualified to cover this timely subject. The book is valuable to technicians in radio broadcasting, television, cinema work and to audiophiles.

**Automatic Record Changer Service Manual, Vol. 7**, 288 pages, Paper Bound. Howard W. Sams & Co., Inc., 2201 East 46th Street, Indianapolis 5, Ind. \$3.00.

Volume 7 of the Changer Manual Series contains complete service data of 7 record changers and 12 tape recorders produced during 1954 and 1955. For record changers complete descriptions of the change cycles and suggested remedies for correcting any malfunctions are presented. Schematics, parts lists, replacement parts data, and trouble shooting procedures are presented for tape recorders.

A cumulative index showing model coverage in all volumes is included in order to enable quick reference to applicable service data. A cross-reference that shows which basic changer mechanism was used in a particular receiver is also included.

## Ampex Recorder

*Continued from Page 4*

Video Tape Recorder must record frequencies as high as four megacycles (4,000,000 cycles per second). Present day magnetic recording techniques demand that, to increase frequency response, the tape must be moved past the head at higher rates of speed. To obtain a frequency response of 15,000 cycles per second, Ampex audio tape recorders use a tape speed as low as 7½ inches per second. By direct ratio, to obtain the four-megacycle response needed for video recording, tape speed would have to be 2,000 inches per second. At that rate, a reel of magnetic tape 14 inches in diameter would record only 29 seconds of program material.

Ampex engineers have developed a system which permits a tape speed of only 15 inches per second, permitting more than a full hour's program to be recorded on a single 14-inch reel of tape. To achieve this relatively low tape speed—a standard speed used in some recording—a magnetic head assembly which rotates at a high speed is used, giving an effective tape speed sufficient to record and reproduce the full four-megacycle band width. Thus, while the tape moves slowly, the heads move across the surface of the tape at a very high speed. The head assembly actually consists of four heads placed on a rotating drum. One head is always in contact with the surface of the tape. As one head leaves the tape, the next head makes contact. The magnetic pattern is recorded transversely across the tape instead of longitudinally as in conventional audio recorders.

The sound that accompanies the picture is recorded in the ordinary manner along one edge of the magnetic tape.

Salé price of the three prototype units to CBS was \$75,000 each, according to Mr. Gundy. He stated that Ampex has decided to fabricate a limited number of prototype units to meet the immediate demands of television networks and of government and private research laboratories investigating use of the machine for wide-band instrumentation recording.

Commenting on the recording of color television programs on magnetic tape, Gundy stated that Ampex engineers have determined that there are several practical approaches to expanding the basic technique to include color. "Ampex has under way the development of a system for recording programs in full color as a logical extension of the current development," he said.



Phenomenon of the universe  
now heading for an  
eleven-year peak . . .

# THE SUNSPOTS ARE BACK

*Prepared by the  
National Geographic Society*



**"FLYING** birds" may soon be back on the sun, and strange ghosts will ride the airwaves of earth.

Television images may flicker, dissolve, or suddenly speak Spanish. Police broadcasts will reach unexpected distances, or nowhere at all. FM radios perhaps will tune in telephone calls. For all this, blame will fall roundly—and rightly—on sunspots.

The phenomenon of sunspots, now headed for an 11-year peak in 1957-58, holds nearly as much mystery today as when ancient Chinese saw flying birds on the sun, the National Geographic Society says.

When the sun erupts in its periodic black rash, unseen storms of magnetic force sweep the earth's atmosphere. In the electrified layer known as the ionosphere, radio transmissions go astray.

Likewise, over high latitudes, skies blaze with the glowing night fireworks of the auroras, or polar lights. Barrages of cosmic rays bombard the upper air, seeming to come in great streams from the sun.

What is a sunspot? Scientists do not agree. Most describe it as a storm in the sun's atmosphere, a whirlpool or eddy in the swirling outer layers of that gaseous furnace.

Though their cycle of coming and going is both regular and long known, there are few clues to why or how sunspots form. They seem to be simply dark holes that suddenly appear.

Despite their modern sun instruments, astronomers remain much like pilots flying in the stratosphere above a tornado. They can look down into the storm but cannot see how deep the dark funnel goes.

Once sunspots were thought to be cooler than

their surroundings. But now they are regarded as much hotter, vents of energy so intense that much falls outside the visual range. Hence the spots seem dark.

They are not absolutely black. If all the sun were blanked out except for a single large sunspot group, the earth would still receive as much light as from 100 full moons.

The largest sunspot on record occurred in early 1947, during the last peak period. It spread 200,000 miles across the sun's face, nearly a quarter of its diameter. Billions of square miles were dimmed.

Such blemishes, plainly visible to the naked eye through light overcast, fog, or dark glass, have fascinated man for countless centuries. Chinese astronomers recorded sunspots as early as 28 B. C.

A huge sunspot about A. D. 807 was thought a portent of the death of Emperor Charlemagne seven years later. Sunspots have been blamed for war, bad weather, plagues, and even in modern times, for man's unrest.

The first truly scientific study of sunspots was made by Galileo. He saw them forming and dissolving on the sun's surface and noticed that they moved. Thus he deduced that the sun, like the earth, rotates.

Among modern studies of sunspots, a National Geographic Society research project led by Dr. Carl W. Gartlein of Cornell University since 1938 has probed the causes and nature of "northern lights," the auroras.

Similarly, cosmic ray research sponsored by the Society has given strong evidence that the sun's dark disturbances may be linked to the continual powerful radiation that bombards the earth.



Porpoise feeding and . . .



alligator wrestling are

important activities in Florida next month, but most important is the . . .

## Radio-Television-Recording PROGRESS MEETING

**O**N May 11, 12 and 13, the Radio, Television and Recording Division of the Brotherhood will hold its annual conference. This year, the sessions will be held in the Monte Carlo Hotel at Miami Beach, Fla.

There is still time to select delegates from your local union and attend to the necessary hotel reservations. (Hotel costs: European plan—\$6 a day single and \$7 a day double; American plan—\$9 a day single and \$12 a day double.)

A full agenda of topics is being listed for discussion and action. Sure to be on this agenda is

the growing problem of remote control operations, problems of organizing, strike difficulties, particularly in the South, and much more.

IBEW General President Gordon Freeman and General Secretary Joseph Keenan are scheduled to attend. This will be the first opportunity for many local broadcasting leaders to meet the new president of the Brotherhood.

Registration information has been mailed to all local unions. Every broadcasting and recording local should be represented at this important conclave of the recording and broadcasting division.

# Electron Tube Information Service

Federal agency acts as clearing house for electronics data

THE National Bureau of Standards has established a tube information service for accumulating and disseminating technical data on both domestic and foreign radio tubes. At the present time nearly 10,000 cards, filed by tube type number, are appropriately referenced to manufacturers' source material. In addition, about 10 per cent of these cards, selected mainly from the high-use miniature and subminiature types, have been coded on punched cards for mechanical sorting.

With this unique service, it is possible to find (1) information about any particular tube, (2) all tube types whose electrical characteristics, bulb sizes, or base configurations fall within particular ranges, and (3) domestic tubes that can be substituted for unavailable foreign tubes. Recently, junction diodes and transistors have been added to the bureau's program. The program began about seven years ago as a service to NBS personnel. It has since been extended to all scientists and engineers in Government and industry who have legitimate requests. This continuing service is being carried out by C. P. Marsden and J. M. Moffitt of the bureau's electron tube laboratory.

## Punch Card Coding Started

The NBS tube information service was established to meet the ever-increasing number of re-

quests for information that was not readily available on little-known tubes or tubes of foreign manufacture. As the service grew, it included more and more detailed information on larger numbers of tubes. Recently the bureau has begun punched-card coding for automatic selection in order to process requests more rapidly. The goals of the service are to include the latest technical data on all domestic and foreign tube types and to have all such information coded.

## Variety of Data Available

The service includes all such data on electron tubes and semiconductor devices as electrical characteristics, bulb size and base configurations, ambient operating conditions, and where possible, construction details. The main source of this information is the manufacturer's brochure or handbook. While the major companies automatically furnish the information through their distribution lists, numerous new and small companies must be queried directly whenever preliminary information on their products is gathered from advertisements, articles, and brochures. Special attention to these scattered sources has been required to maintain current the file on crystal diodes and transistors. The NBS files include products of about 80 domestic and 15 foreign manufacturers.

Table I. Coding Classifications\* of Tube Types for the NBS Tube Information Service

Function	Suppressor	Number of electrodes
power amplifier	brought out	Physical size
converter	tied to cathode	Frequency
detector	Filament (or heater)	Mutual conductance
voltage regulator	voltage	Amplification factor
voltage reference	current	Plate resistance
Emitter type	Current	Plate dissipation
coated filament	plate	Peak inverse voltage
thoriated tungsten filament	screen	Interelectrode capacitances
tungsten filament	General characteristics	
unipotential, coated	double cathode	
dispenser	double-ended	
cold cathode	beam power	
Normal operating voltages	sharp cutoff	
grid	remote cutoff	
plate	electrometer	
screen	metal envelope	
suppressor	guided missile	
	hearing aid	

\* At the present time, punched-card coding has been completed only for miniature and subminiature tubes.

In general, foreign data has been limited to Western European sources.

So far, the bureau has received requests for tube information mainly from other Government agencies, the military services, foreign governments, and local private industries. Most of the inquiries have been for information about the electrical characteristics of a particular tube type or the selection of a domestic tube for replacement in foreign equipment. Although this sort of request is easily met, questions on cathode operating temperature or contact potentials must be answered in general terms because these quantities vary with the manufacturer. Queries on tube types with specified electrical, mechanical, or geometric characteristics are usually answered by a combination of machine card sorting and reference research. Clearly, only general information can be coded on punched cards; after machine selection of several tubes that meet the specifications of the inquiry, reference research is required to supply the more specific information. In general, coding is on the basis of operating voltages, transcon-

ductance, etc.; and the tube types machine-selected are those within the ranges specified by the inquiry.

While the coding on punched cards has been completed only for the miniature and subminiature tubes with bulb sizes up to T6 $\frac{1}{2}$ , the bureau plans to proceed as rapidly as possible with the coding of all other tube types. The semiconductor devices are being coded as soon as the information becomes available.

Note: The bureau's service is open to all who have legitimate requests. Inquiries may be made by telephone if desired. However, they should contain as much factual information as possible to expedite the reference research, and should include background information where appropriate. The service cannot undertake to answer queries on tube applications in circuits; complex or highly detailed questions that may require laboratory research can be answered only on the basis of data available. Address inquiries to C. P. Marsden, Chief, Electron Tubes Section, National Bureau of Standards, Washington 25, D. C. Manufacturers are urged to supply the bureau with technical information on new tube types as they are placed on the market, so that the service can include all the most recent data.

## Typical Requests for Information

1. What are the American equivalents of the KT-66?

Answer: 6L6 WGA, 5932

2. What type deflection and focus do the following Cathode Ray tubes have?

Answer: 16ZP4 Magnetic focus and deflection  
17AP4 Magnetic focus and deflection  
17HP4 Electrostatic focus, magnetic deflection

3. What is designation of a subminiature having a high  $\mu$ , and high Gm and is similar to 5744 WA?

Answer: 6151 is a near equivalent

4. What is miniature equivalent for the subminiature 6111?

Answer: 12AT7WA and 6201.

5. a. What are plate current and Gm of the following types?

Answer:	Plate Current	Gm
5875	3.5 ma	2500 umhos
5636	3.5 ma	1280 umhos

- b. What are characteristics of the following crystal diodes and transistors?

Answer: 1N107 crystal diode

Forward current at 1 v	150 ma min
Reverse current at 10 v	200 ua max
Peak inverse voltage	—15 v min
Maximum operating voltage	10 v max dc

1N67A crystal diode

Peak inverse voltage	100 v
Continuous operating inverse voltage	80 v
Peak rectified current	90 ma
Surge current for 1 sec.	350 ma

G-11 transistor

Collector dissipation	100 mw
Collector voltage, V	30 v
Collector current, I	7 ma
Emitter current, I <sub>e</sub>	3 ma

6. What is the frequency and wavelength range of the light output of a glow modulator R1130B?

Answer: Modulating frequency range 15-15,000 c/s  
Useful light range 3500-7200 Angstroms

7. Is the 25B5 still being manufactured? What is a replacement for it?

Answer: The 25B5, which had a 6-pin base, is no longer being manufactured. It can be replaced by the 25B6, 25C6, 25L6GT or 25N6, all of which have octal bases.



# TV Permits Engineer to Be Two Places at Once On Southern Missouri Spillway Construction

**I**N southern Missouri, near the Arkansas border, a big multi-purpose earthen dam and concrete spillway is under construction. Called Table Rock Dam, it stretches 4,800 feet across the White River and will eventually back up 2,700,000 acre-feet of water in a huge reservoir.

A hundred-per cent AFL-CIO union job, it employs an operating engineer in a unique job involving an RCA TVI camera and an ordinary 17-inch receiver. Seated in a self-propelled control tower, as shown at right, he watches and controls the lowering and hoisting of big concrete buckets which move on railroad flatcars from the batch-mixing plant on a rocky ledge of the White River down to the forms in the spillway and power plant area. Meanwhile, he is able to check via the TV receiver, the operation of the big hoisting drums which work the hoisting and lowering cableways and are housed in a building a half mile away.

The TVI, equipped with a short focal length lenses, is mounted high above the hoisting drums, which are well lighted with floods. The signal is transmitted to the receiver in the cableway operator's tower by a RCU-11 coaxial cable about 5,000 feet long. The signal is boosted at three points on the cable by use of RCA SX 150 booster amplifiers.

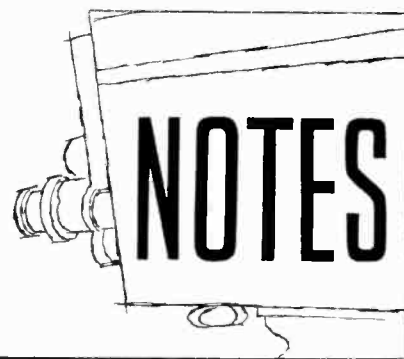
The receiver is regulated by a 300-watt Solar Televolt constant voltage transformer. Operators say that the reception does not vary with weather changes. The system has worked well for the contractors. They are now considering installing an additional

camera, with a wide angle lens somewhere around the loading buckets on the flatcars so that the

cableway operators can more carefully watch the emptying of the buckets at the forms.



The cableway operator watches concrete pouring from his self-propelled tower. Note the 17-inch receiver over his head from where he gets an overall view of area where he must dump huge buckets of concrete. The hoisting drums are housed in a building about a half mile away.



## ***'Midget' Power Supply***

Development by the Radio Corporation of America of a revolutionary power supply unit, for use with television studio equipment, which reduces tube and space requirements by more than 70 per cent, has been announced by Dr. James Hillier, chief engineer, RCA Commercial Electronic Products.

"The 'midget' powerhouse," said Dr. Hillier, "produces 1,500 milliamperes output, requires only 10½ inches of rack space, and provides more than 250 per cent more usable power than previously available RCA types.

"This new power supply (WP-15) is designed for both commercial and closed-circuit television applications and will have a wide range of uses in the industrial and laboratory field. It is scheduled for commercial availability in May, and will sell for \$675, which we believe to be the lowest price for power supplies of its output class.

"Development of this power supply represents an important contribution to more efficient and economical television broadcasting. Significantly smaller, simpler, and more efficient than previously available power supplies, the new unit will enable broadcasters to conserve valuable studio space, reduce operating costs, and simplify maintenance and replacement-parts inventory."

Indicative of the "midget" unit's space-saving potential, one WP-15 power supply will provide the current requirements of a complete black-and-white live or film TV camera chain, including the master monitor, compared with two appreciably larger-size power supplies previously required. Two of the WP-15 power supplies will serve the current needs of a complete color TV live camera chain, compared with the full rack of power supplies now needed.

The incorporation of high current capacity in a compact package, Dr. Hillier explained, was made possible by the utilization of advanced circuitry and new hermetically sealed high-efficiency ger-

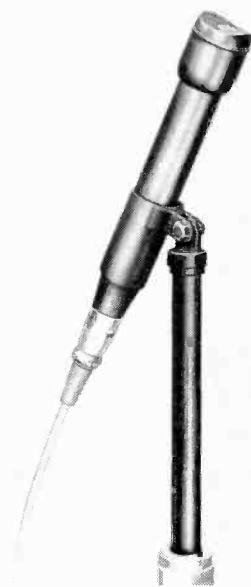
manium rectifiers. The over-all advanced design enables the small unit to generate 1,500 milliamperes of power output at 280 volts with only six electron tubes.

Compared with conventional-type RCA power supplies, such as the RCA WP-33B, required for an equivalent 1,500 milliamperes output, the new unit occupies only 10½ inches of rack space, compared with 35 inches; operates with only six tubes, compared with 25; has 23 per cent greater efficiency, or minimum power loss through heat dissipation; and will be available to broadcasters and other users for \$675, compared with \$1,440.

A new feature of the power supply unit is dual-chassis construction to simplify installation. The unit consists of a rectifier chassis, containing all rectifier and filter elements, and a regulator chassis, incorporating the six-tube complement and regulating elements. The separation of rectifica-

**"ACOUSTIC GATE" MICROPHONE**, for broadcast or P. A. use. The slender Altec Lansing 680A dynamic microphone introduces the unique "Acoustic Gate" principle to provide high quality broadcast performance throughout an extended frequency range. A peripheral sound entrance channel of 2 mil width, the "Acoustic Gate" provides an acoustical resistance loading, virtually independent of frequency to the front of the diaphragm, thereby eliminating high frequency peaks and extending the

smooth frequency response over an exceptionally wide range. This microphone design also lessens the effects of wind, water, dirt or weather, and allows the microphone to be used under adverse conditions.



tion and regulation functions permits installation of the power supply as a combined or separated unit, according to need or desirability. The unit includes many other engineering and safety features.

### ***Chromacoder Work***

General Electric is proceeding with "intensive" work on the CBS-developed Chromacoder, a camera device which translates information from field sequential color to compatible color, a spokesman for the manufacturing firm revealed recently.

CBS, some time ago, turned over all of its research and development on the Chromacoder to GE in an agreement effected between the two. The question about the device—i.e., what has happened to it—was asked last week by the French delegation of the International Radio Consultative Committee (CCIR), which has been in the U. S. to study color TV.

The foreign group, made up of some 100 engineers representing more than 20 countries in Europe and elsewhere, asked questions of a "panel" of top U. S. electronics scientists and engineers at the United Nations Bldg., in New York.

### ***Color Servicing Book***

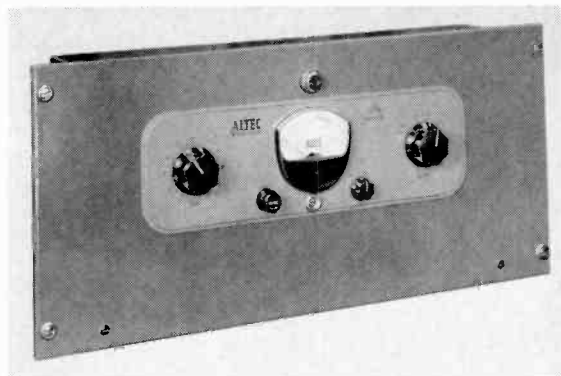
Publication of a new 92-page illustrated reference book on color television receiver servicing has been announced by E. C. Cahill, President, RCA Service Company, Inc.

The book, "Servicing Color Television Receivers," is designed principally for reference use by dealer and independent servicemen who have attended the many color TV clinics and workshops throughout the nation sponsored by the RCA Victor Television Division and its distributors.

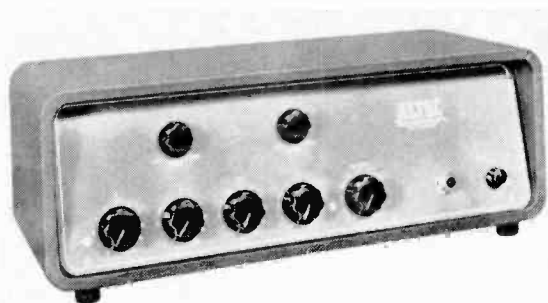
The book, which deals specifically with the current RCA Victor 21CT660U series, describes the tools required for efficient color receiver servicing; tells how to use these tools; discusses procedures for determining specific needs for servicing; shows representative waveforms obtainable with an oscilloscope at various points in the receiver; and gives practical information useful for localizing the source of trouble.

Copies of the book are given free to each serviceman attending a color television workshop or clinic. Additional copies may be secured from the Commercial Service Section, RCA Service Company, Inc., Camden, N. J., at \$1 per copy.

Mr. Cahill said attendance at more than 350 color TV clinics conducted by the RCA Service Company throughout the nation totals more than 75,000 servicemen. Attendance at more than 180



**ALTEC 30-WATT POWER AMPLIFIER**, for recording and broadcast use. The 128A is built for professional applications where highest quality and reliability are required. It is an improved version of the 127 type amplifier. Retains all the sturdy features of the 127, including metering, step-type gain control and trouble-free class AB1 circuitry. Provision for a plug-in input transformer and accommodation of the full variety of load impedances contribute wide versatility. May be mounted on a relay rack or in the 12066 cabinet.



**THE ALTEC 342A AMPLIFIER**—The 342A is a 20-watt P. A. amplifier for mixing four inputs simultaneously and incorporating the "input-matcher" for outstanding flexibility. Any combination of four sources can be plugged in, and with the convenient "input-matcher," the Altec 342A is matched exactly to the specific needs of each source. Thus, the 342A can be quickly "input-matched" to any high-or-low-impedance microphone, crystal or magnetic phono pickup, tuner or tape recorder. DC operation of the heaters of the input tubes insures hum-free performance and eliminates the need for tube selection. It provides individual volume control for each of the four inputs, a master volume control, and separate bass and treble tone controls—all mounted on a slanted panel for easy operation and visibility. The 342A is housed in a wooden cabinet covered with leatherette.

workshops, where the servicemen actually work on color receivers, is nearly 4,500. Meanwhile, RCA distributors hold many additional workshop sessions of their own for servicemen in their areas.

# Station

# Breaks

## ***Components Symposium***

Foreign and American industry executives and government authorities will join together in making a comprehensive review of accomplishments in the electronic component field and in surveying its future trends during the "1956 Electronic Components Symposium" to be held in Washington, D. C., May 1-3. The program is divided into seven sections, including an evening session devoted to electron tubes and solid-state devices.

## ***Grecian Equity***

Historians at Athens, Greece, have uncovered one of the earliest records of a walkout which took place there in 169 B. C. Actors left a performance wearing costumes and paraded through the streets demanding payment. It seems that they were paid only with food.

## ***New TV Amplifier***

Standard Electronics Corp., Newark, N. J., has announced the availability of its new 25 kw tv amplifier for channels 2 through 6. The new equipment, produced by Standard, a subsidiary of Dynamics Corp. of America, is priced at \$50,000.

Among the advantages cited by Standard for its new amplifier are a lower investment cost than any available competitive make; lower floor space requirements—two cabinets occupy 23.5 sq. ft.; reduced weight—4,000 pounds or approximately 170 pounds per sq. ft.; low power consumption—63 kw at 90 per cent power factor at black level; full-length glass doors permitting visual inspection of all tubes even while the amplifier is operating, and lower operating cost.

## ***WTTW Gets Calls***

WTTW, Chicago, received 60,000 telephone calls in two hours in response to an invitation for questions about income tax, during their program, "Spectaxular," February 26.

Station manager John W. Taylor reported that 611 telephone messages were taken for the panel

of tax counsellors, but that Illinois Bell Telephone Company stated that over 60,000 calls got the "busy" signal and were not completed.

The popular instructor on "Eins, Zwei, Drei," Dr. Frederick Schwartz, is making a second appearance on ETV in Chicago in a series on conversational German for the tourist, "Touristen Deutsch."

Dr. Schwartz is returning to ETV literally by popular demand. His original introductory course in German brought wide acclaim from viewers, unprecedented for language courses.

The Educational Television and Radio Center will distribute the series later this year as an exchange program from Chicago. The introductory course originated at Iowa State College in Ames, Iowa, where Dr. Schwartz is a professor in the Department of Modern Languages.

The station is an LU 1220 contractor.

## ***Wooten Invents 'Co-Phaser'***

A "Co-Phaser," designed to reduce reception interference of TV stations operating on the same channel in different communities, has been invented by S. D. Wooten, Memphis, Tenn., pioneer broadcaster and inventor.

Mr. Wooten's device consists of a secondary antenna installed below the primary antenna and pointed in the opposite direction. Usually interference is caused when the main antenna picks up the signal of the unwanted station. With the "co-phaser," the unwanted beam, which comes in from the rear, is picked up by the secondary antenna.

A control connected to the TV set is adjusted so the secondary signal is flattened and eliminated. Mr. Wooten has reported that field tests have proven his system satisfactory.

He estimates installation of the second antenna would range from \$15 to \$20 and the control purchase price would be less than \$30.

## ***Technician-Engineer***