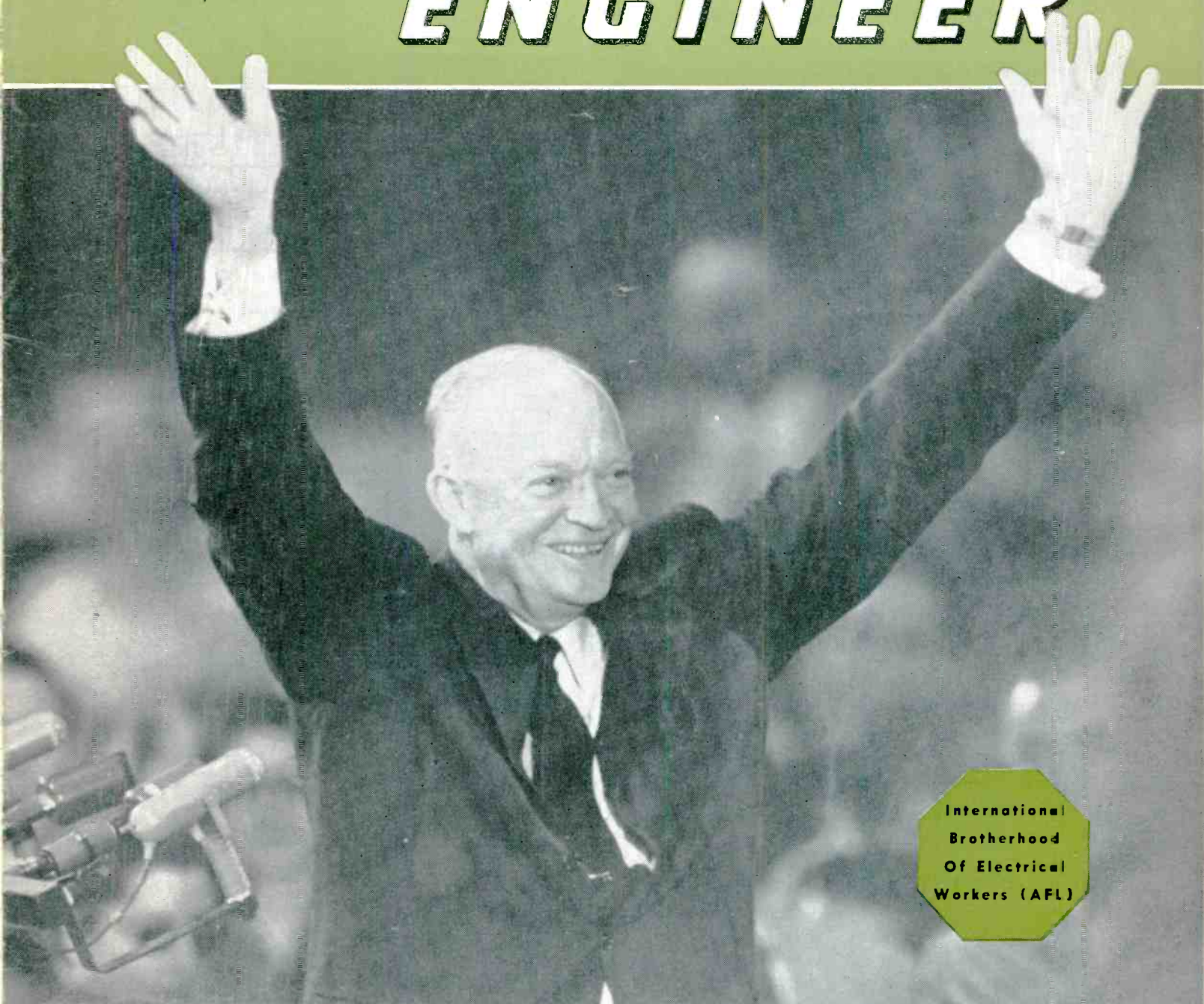


RADIO, TV and RECORDING

TECHNICIAN-ENGINEER

NOVEMBER, 1952



International
Brotherhood
Of Electrical
Workers (AFL)



official action

FEDERAL COMMUNICATIONS COMMISSION

AM Band Extended to 540 kc

The Federal Communications Commission has finalized its rule making proposed last June 18 to add 540 kc to the AM broadcast band, leaving the way open for Class II stations in a few parts of the country to seek that frequency.

The AM broadcast band now is specified at 535 to 1605 kc instead of 550 to 1600 kc. FCC rules governing the AM band are amended accordingly.

In 1947 the FCC initiated proposals to extend the AM band to 540 at the Atlantic City International Telecommunications Conference. The suggestion was approved by the Conference. Then, in 1951 a Geneva agreement supplemented the approval and specified December 1, 1952, as the date for bringing the 540 kc provision into effect.

The action climaxed several years of attempts by U. S. and Canadian broadcasters to extend the band into the more desirable lower frequency area just above 500 kc, the international distress call channel.

The first proposal for extending the band lower came to the Madrid Telecommunications Conference in 1932, when the Canadian delegation, supported by many U. S. broadcasters, sought AM use of 520, 530 and 540 kc. The U. S. delegation opposed the proposal at that time.

The 540 kc frequency is designated as a Canadian clear channel, giving this frequency Class II status in the U. S. under the North American Regional Broadcasting Agreement. The use of the frequency was conceded to Canada in 1938 in an executive agreement with the U. S.

Western Union Costs Changes

Western Union football and hockey "full-description" service to radio and TV stations may cost more in some sections of the country this season, less in other areas depending on components cost in each instance. In October, FCC granted the common carrier permission to amend its tariffs on not less than one day's notice in certain respects. The football tariff became effective November 7, FCC reported, while the hockey tariff runs until April 15. Component costs for each subscriber differ, it was explained, since they include variables such as telephone line charges and operator wages. On an over-all basis, costs this year are no more than before, Western Union told the nation's broadcasters.

RADIO, TV and RECORDING TECHNICIAN-ENGINEER

Published monthly by the International Brotherhood of Electrical Workers (AFL), 1200 Fifteenth St., N. W., Washington, D. C., for the men and women employed in the recording, radio and television industries.

D. W. TRACY
President

J. SCOTT MILNE
Secretary

VOLUME I

17

NUMBER 11

Entered February 20, 1952 as second-class matter at Washington, D. C., under Act of August 24, 1912.

PRINTED ON UNION MADE PAPER

Statement required by the Act of August 24, 1912, as amended by the Acts of March 3, 1933, and July 2, 1946 (Title 39, United States Code, Section 233) showing the Ownership, Management and Circulation of

RADIO, TV AND RECORDING TECHNICIAN-ENGINEER

Published monthly at Washington, D. C., for October, 1952.

1. The names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher—International Brotherhood of Electrical Workers, 1200-15th St., N. W.

Editor—Albert O. Hardy, 1200-15th St., N. W.

Managing Editor—None.

Business Manager—None.

2. The owner is International Brotherhood of Electrical Workers, (A. F. of L.), an unincorporated labor organization, 1200-15th Street, N. W., Washington 5, D. C.

3. The known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. Paragraphs 2 and 3 include, in cases where the stockholder or security holder appear upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting; also the statements in the two paragraphs show the affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner.

5. The average number of copies of each issue of this publication sold or distributed, through the mails or otherwise, to paid subscribers during the 12 months preceding the date shown above was: (This information is required from daily, weekly, semiweekly, and triweekly newspapers only.)

(S) ALBERT O. HARDY

Editor,

THE TECHNICIAN-ENGINEER

Sworn to and subscribed before me this 3rd day of October, 1952.

(Seal)

LAWSON WIMBERLY

Notary Public, District of Columbia.

My commission expires September 30, 1957.

Transit FM Wins Again

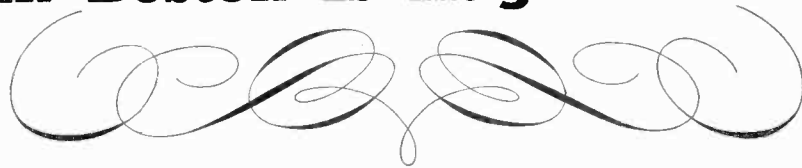
A petition by a Washington, D. C., attorney, who sought to intervene with Transit Riders Assn. in protest against the license renewal of WWDC-FM in the transit FM case, was dismissed by the FCC in October.

The attorney had filed a protest against the renewal on the same day FCC rejected the TRA complaint.

Transit Riders Association, a non-profit organization, has been battling in behalf of Washington's "captive audience" since late 1949. It has characterized the WWDC-Transit Radio operation in the nation's capital as "not dissimilar to methods used to disseminate propaganda in totalitarian countries."



Stewards' Progress Meeting In Boston Is Huge Success



**14 Boston Stations Represented in All-Day Session
Held in Banquet Room of Downtown Hotel; 'Packaged'
Rules and Regulations Included in the Discussions**

HAVING seen the advantages of a progress meeting amply demonstrated by the Memphis meeting last spring, Local 1228 decided to hold a "Stewards' Progress Meeting" on October 16 at the Hotel Kenmore in Boston. President D. A. Leary and Business Manager George T. Cairns reported, at the conclusion of the all-day session, that they were completely satisfied with the results.

Stewards from 14 Boston stations were present and those who were unable to be in attendance all day were in and out of the meeting, as working assignments

required. In addition to the information gleaned from the stewards' reports and talks by the officers of the local union, there was a considerable amount of printed information available—about which many favorable comments were made. This latter information consisted of copies of FCC Rules 3 and 13, the NLRB "Rules of Procedure," a pamphlet dealing with stewards' responsibilities and duties, copies of the IBEW Constitution and the Local Union By-Laws and a pattern form IBEW agreement. While some of the material had previously been placed in the hands of the



● Bill Bazzy, Chief Steward, discusses a problem of local rules and regulations. Beside him, foreground, Jim Eastman, WBZ-TV, and Walter Wishnfsky of Station WBZ-AM.



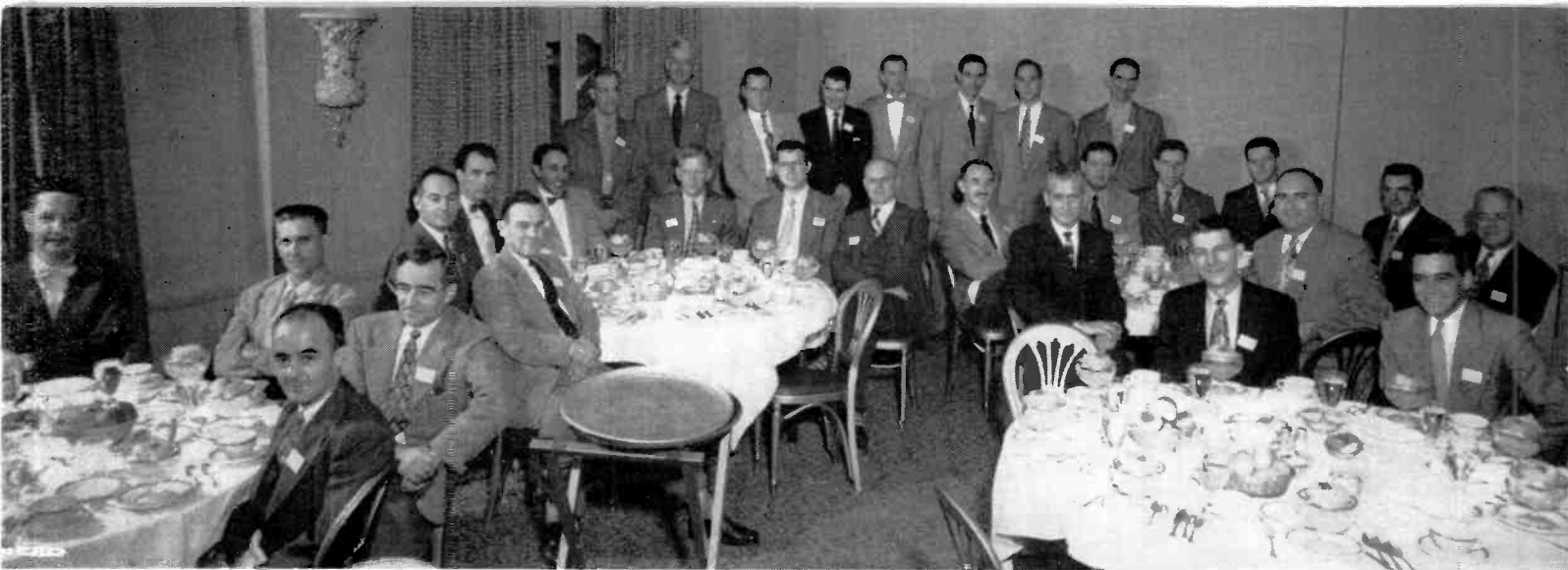
● Jim Eastman has the floor to discuss a stewardship problem. Bill Simmons of Station WLLH, foreground, listens attentively. In the far corner, Jack Moakley, Recording Secretary.

● Round the table the discussion goes. Now it's Wishnfsky up, with Paul Levin, WHDH, and Bill Flynn, WNAC, listening.



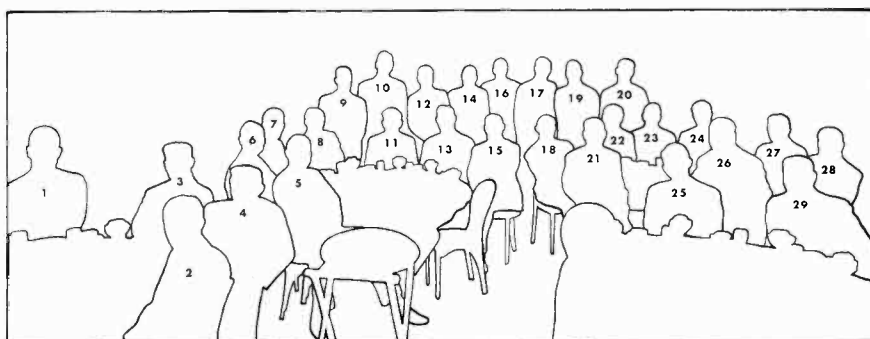
● Each man presented his own shop's problem to the Boston meeting, and finer points were discussed.





stewards, a good bit of it had become so dog-eared that a complete new kit was necessary. With the addition, by each man, of his employer's agreement—as B. M. Cairns, put it, “Here are all the rules and regulations in one package—the FCC rules by which the employer lives, those which govern the employees, the NLRB regulations which govern both the employer and the employee and the rules by which officers and members of the union are governed and the rules and regulations in each employer's shop.”

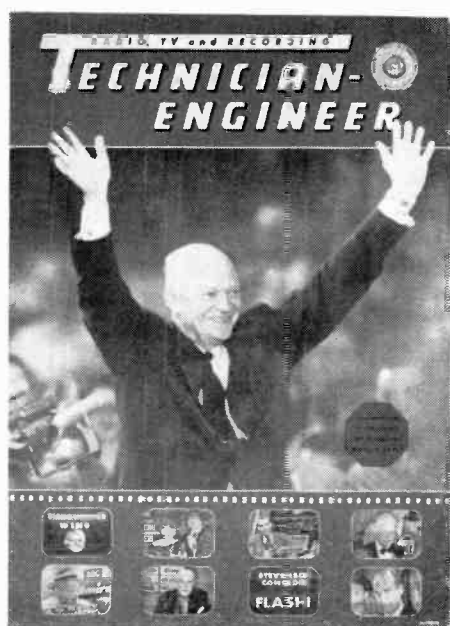
Luncheon was served to the delegates and there was therefore no lull in the discussion of problems and plans. International Representative Walter Reif, representing International Vice President Regan and the



BOSTON MEETING PARTICIPANTS: 1. A. O. Hardy, Director, Radio, TV and Recording, IBEW. 2. Raoul Nadeau, WMUR. 3. Leo Boisvert, WHEB. 4. Walter Reif, Int'l Representative. 5. Don Farrell, Treasurer. 6. Ben Budz, WBZA. 7. Bob Hickey, WBZ-Hull. 8. Bill Bazy, Chief Steward, WBZ. 9. Clarence Morton, WLAW-XMTR. 10. George Cairns, Business Representative. 11. Jim Eastman, WBZ-TV. 12. Bill Simmons, WLLH. 13. Walter Wishniefsky, WBZ-AM. 14. Dan Leary, President. 15. Norman Bacon, WBZA. 16. Ken Smith, Executive Board. 17. Arnold Ginsberg, WORL. 18. Paul Levin, WHDH, Studio. 19. Bill Burke, WMEY. 20. John Hotz, WTAO. 21. Jack Moakley, Recording Secretary. 22. Ralph Mathewson, WEEL-XMTR. 23. Ed Weiss, WKOX. 24. Bob Lawless, WVOM. 25. Harry Handfield, WOTW. 26. Jerry Hession, WNAC-TV, XMTR. 27. Paul Kane, Examining Board. 28. Mike Kelley, WNAC-AM, XMTR. 29. Claude Marquis, WFEA.

Second District, attended the session as did A. O. Hardy, from the International Office in Washington.

Local 1228 is planning this type of meeting to be continued in the future, on a regularly recurring basis.



THE COVER

Eisenhower Leads a Republican Sweep

The opinion poll boys stayed close to the tree trunk until midnight, November 4 . . . almost until the time that Stevenson conceded the election. Practically none of them foresaw a landslide.

One group of pollsters, however, started making predictions early . . . and nobody argued the point. This group included Messrs. Hooper, Neilson, et al, and their safe prediction was that TV and radio receivers all over the nation would be on till all hours the night of November 4. Election night was a real extravaganza of the Hollywood variety. And what made it so was the excellent work of radio and TV teams all over the nation broadcasting the returns. It was a job to make any engineer proud.

ON JULY 10, 1951, Randy Turpin floored a surprised Sugar Ray Robinson, as Robinson was returning to the States from a tour of Europe, and took from him the middleweight boxing title.

American sports fans were astounded, and New York promoters, knowing a good thing when they saw it, rushed to schedule a return bout.

A group of theater owners saw a good thing too, and they rushed to sign up an exclusive, closed-television hook-up of the fight, going to a chain of theaters in the major cities.

Home TV viewers and radio listeners who couldn't travel 500 miles or more to the nearest theater-TV showing could stay up, drink their midnight coffee, and wait until the bout's decision was reported on a late newscast. Or they could read the results in next morning's paper.

In the dismayed audience of sports enthusiasts who awaited the fight decision were Congressmen and their constituents. Almost before you could say "filibuster" Congressmen were planning an investigation and some form of legislation to keep this from happening again.

During the same year, ticket takers at many baseball box offices were turning in unsold rolls of ducats and saying that it was television that caused it. That sounded like it'd hold water, why hadn't they thought of it before, so the park managers passed it on to the teams' owners.

By the close of the year, the rumors about TV had spread to the college campuses. The athletic department told the coach that if he wanted

new jerseys for his boys . . . and bigger steaks on the daily muscle board . . . his boys had better start playing football. It's not the boys, replies the coach, it's this television. People jus' staying home and watching the game on their TV

sets. Well, we'll put a stop to that, says the alumni chief.

By 1952, the American sports world was arguing the pro and con of television sports coverage with gusto.

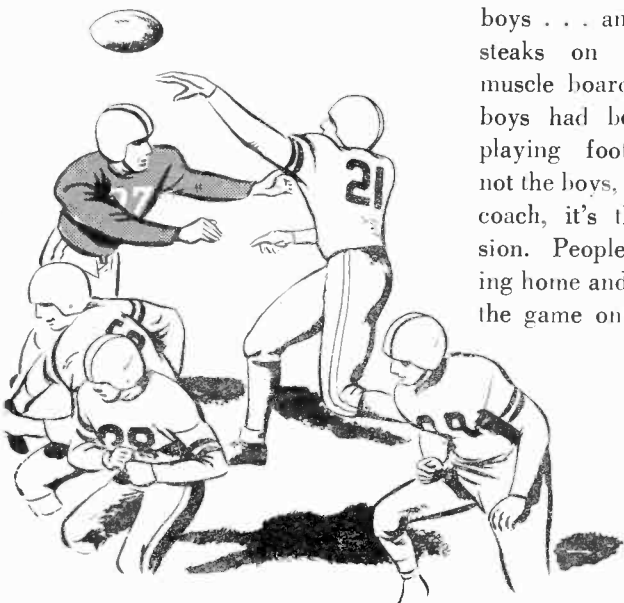
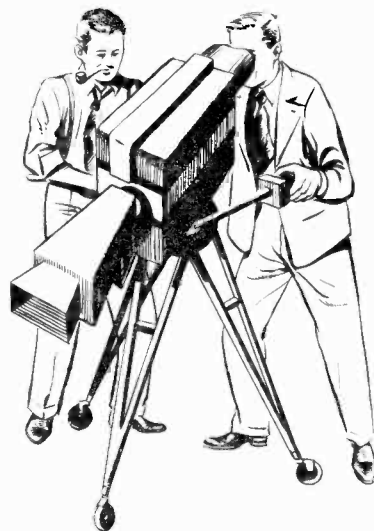
It became increasingly clear to one magazine that Mr. Webster should rewrite his dictionary. "Sport," Mr. Webster insisted, was "that which diverts, and makes mirth; pastime; diversion." Sports, the magazine said, was big business and industry. The baseball leagues were "unionized." Professional or amateur, college or high school, it was now a matter of gate receipts and performance rights — radio, television, theater television.

A Congressional committee began investigating baseball, and it proposed to delve into all sports broadcasts and telecasts. Movie theaters were bidding against radio and TV for exclusive rights on boxing and other events. West Point had a scandal over cribbing by football players, enrolled presumably because of brawn instead of potential military prowess.

It boiled down to a question of whether or not television really spoiled the sports gate. Radio had lived for years in complete compatibility . . . in fact with adulation . . . among the sports promoters. TV posed new problems. Promoters felt that the box office was the real backbone of their income. However, television sponsors offered sizable purses. The problem was a long-range question of whether or not they could get the TV sponsor's purse and the gate too.

Today, if the gate falls off, the promoters feel that television is responsible, even if the particular sports event is not televised. The promoter figures that some other event was being aired, and people stayed home to watch it.

This argument does not hold up when the statistics are brought in. The figures show that in many cases



televised games do as well as or better than non-televised games. In fact, television has probably created new fans and even bolstered the sports drawing smaller audiences, such as ice hockey and basketball.

Wrestling, especially, has got a lot of "gate" via the TV waves. As an example, WSPD-TV, Toledo, Ohio, decided the 148,000 TV set-owners there might prefer something other than "Saturday Night Wrestling," and informed Dumont the program was to be dropped. Within a few days after the cancellation became public and after one night of bouts had been missed, protest calls streamed into the studio from more than 2,000 loyal wrestling fans. So WSPD-TV put the show back on, and any promoter can see each time a camera scans the crowd at ringside that the box office hasn't suffered a dime loss.

● FOOTBALL

Television represents "a \$10-million threat" to college football, according to Robert A. Hall of Yale, chairman of the National Collegiate Athletic Association's special TV committee. He argues that colleges should share receipts of televised football, otherwise a financial premium on winning teams will be created, and it will kill amateur football.

The Sports Broadcasting Committee of the Radio-Television Manufacturers Association disagrees with the first premise.

"The fallacy of the NCAA policy may be noted in the fact that college football has enjoyed phenomenal progress with the development of television," contends the committee. "The dollar income of college football in 1950, (paid admissions), for example, was well above the 1947 peak year of income for most sports. This is important to note because through 1950, college football was the most widely televised of all sports."

The argument over broadcast football has been heated during the past year. It has even involved radio. *Broadcasting-Telecasting* magazine, for instance, cited this example of "football bossism":

"The collegiate football industry, hell-bent to prevent the taxpayers from having what they want, has just won another 'victory,'" the magazine told its readers last May. "It has snuffed out the Atlantic Refining Company's sponsorship of football broadcasts of a score of eastern colleges, terminating 16 years of pleasant and profitable association in radio.

"It was a force play. NCAA has served notice that it will repeat the 1951 monopoly-blackout tactics this year.

"Since it isn't an eleemosynary institution, Atlantic Refining had no alternative. It is turning from Saturday radio to Sunday television; from college to professional games. Thus blocked from telecasting college games, Atlantic did the obvious and dropped college football altogether because it no longer is able "to back

up its radio coverage with television coverage, gaining audience in the newer medium to balance audience losses in radio."

The collegiate football and television situation is turning out to be about the same this year as it was last year—from the public's point of view.

In 1951, the NCAA set up a program of restricted telecasts, under which only one game would be telecast in a given area each Saturday. The same thing will apply this year, but for a different reason.

Last year NCAA called its restricted system "experimental," designed to study the effect of limited or blacked-out Saturdays on gate receipts. Most objective observers felt that the plan proved nothing at all. For one thing, attendance at a football game depends to quite an extent upon how evenly matched the contesting teams are. For another thing, over-all college football attendance was down 6 per cent in 1951 from 1950. For another, according to Jerry Jordan, colleges in TV areas reported a loss of only 4 per cent, while those in non-TV areas were down 10 per cent.

NCAA is ignoring the box-office study idea this year, and has set out upon another approach. It says that the purpose of the 1952 plan is to prevent monopolization of TV revenue by a few big schools. So, in the 11-game schedule, no school may be televised more than once, giving 22 colleges a slice of the TV pie.

● BASEBALL

Some changes in TV plans are planned for major league baseball in 1953. The Washington Senators announced that they would drop all telecasts of home games—despite the fact that through Labor Day the club was about 12,000 tickets ahead of 1951 sales on a comparable date. President Clark Griffith stated that he felt that television was a definite threat to the hometown box office. In place of home-game televising, he hoped to televise the Senators' road games. (Since then he has changed his mind and decided to have 13 of a total of 16 home games telecast.)

President Dan Topping of the New York Yankees would like to ease up on telecasts, too. Yankee game attendance dropped off a few hundred thousand this year. Topping, however, would find it hard to drop home-game telecasts, because of conflicts this would cause with Dodger and Giant plans.

Baseball as a whole was off about 9 per cent as of Labor Day, compared with the previous year's attendance totals. Yet right here you get the first factor which throws off any argument against televised sports: Four of the 16 major league teams had already exceeded their total 1951 gates by September 1, with a month of games left to play. All four televise at least some home games. Statistics aren't offering too much ammunition to the anti-TV promoters.

● BOXING

The professional boxing circles are trying to figure the most profitable kind of television too. The International Boxing Club, leading promoter, frowns upon network TV when it comes to the championship bouts. As a result, the public is getting fewer chances to view the big bouts on the living room receiver.

Last winter a civil suit was filed by the Justice Department, charging the International Boxing Club with tying up the sale of radio, TV, and motion picture rights for championship fights. The government believed that it had a monopoly case against the defendants. There was also the age-old question of rights, which broadcasters have argued ever since the first baseball score went on the air about 30 years ago. The case was filed in New York. To date, nothing satisfactory has resulted.

The most recent network blackout and closed-circuit theater showing of a boxing bout was the Walcott-Marciano fight in September. The fight went out to about 50 theaters, set up by Theater Network Television, Inc. According to reports, TNT paid IBC about \$1

for each ticket sold by the theaters in the lineup, with a minimum of about \$140,000 guaranteed. The theaters themselves were selling tickets ranging in price from \$3.60 to \$4.80.

Something new in banning was added to this bout. The promoter of the fight, Herman Taylor, announced that "any violation of the restriction against round-by-round or blow-by-blow description of the fight by radio or TV will be subject to prosecution"; including specifically a re-creation. Some stations have re-created boxing matches in the manner of the re-created baseball games of Liberty, and boxing promoters now considered this verboten.

Wire services reporting the bout warned broadcasting clients not to carry blow-by-blow or round-by-round description during the fight or a re-creation afterwards. Clients were told they could use 100-word summaries.

As a result, KMPC, Los Angeles, and several other stations had to cancel sponsored re-creation broadcasts.

Many broadcasters recognize the right of sports promoters to protect their sports events as they are in progress, but they do not recognize any right for them to control news of the event after it is over.

Television Moves into the Ozone Circuit

At \$10 per car, with no limit on passengers, a New Jersey Drive-in presents Wolcott vs. Marciano to capacity house

Theater television moved into the ozone circuit in September when the Smith Management Company's S-3 Drive-In, on Route S-3, Rutherford, N. J., used RCA's instantaneous theater television equipment to show (24 by 36-foot) pictures of the Joe Walcott-Rocky Marciano world heavyweight title fight.

The telecast, witnessed by a capacity crowd of thousands of boxing fans, made theater history, of a sort.

- It represented the first use of theater television in a drive-in theater.

- The TV pictures shown on the S-3's screen were the largest ever projected.

- The projection throw "of more than 125 feet" was the longest ever used in theater TV.

The program also hung up a new attendance record at the Rutherford Drive-In, which is the largest outdoor theater in New Jersey and one of the largest in the country, it was disclosed by Howard Chandler, manager of the S-3.

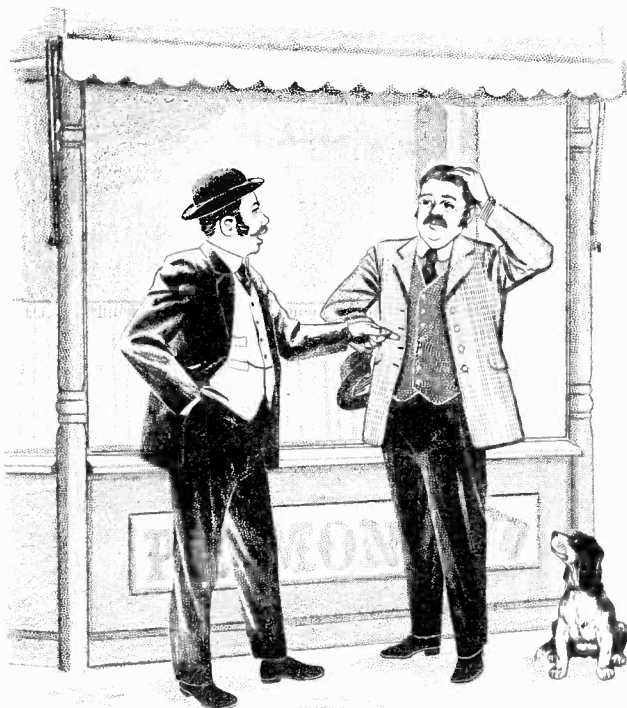
Announcement that the S-3 would screen the telecast of the world heavyweight title fight brought a land-office rush of advance ticket business at the box office. The early response resulted in a sell-out by the preceding Saturday night. Advertising time contracted for with Station WPAT, in Paterson, N. J., was used Mon-

day to make apology for the limitation in available facilities at the theater.

The S-3, which normally accommodates 1,300 automobiles, used available space in recreational and other areas outside the regular parking ramps to park 200 additional cars. About 6,000 seats were installed in a special "walk-in" area to help accommodate the record throng.

The equipment used for the drive-in theater TV debut consisted of RCA's Model PT-100A standard theater television system, mounted in a five-ton truck, which served as the outdoor projection booth. The RCA Service Company made the installation. The signal used was microwaved from the Empire State Building, which is only 5½ miles from the S-3. The American Telephone and Telegraph Company provided cable facilities from Rutherford Center to the drive-in, a distance of more than four miles. An usually strong signal and clear pictures were obtained throughout the fight.

The S-3 offered a double-bill film show in addition to the televised fight. The film "Walk East on Beacon" was shown before the fight, and "The Thief of Damascus" was screened after the bout. The admission charge was \$10 per car, with no limit on the number of passengers riding in each car.



Mr. Dooley Explains the Open Shop

BY F. PETER DUNNE

About 40 years ago, F. Peter Dunne was the Will Rogers . . . and maybe the Herb Shreiner . . . of his day. His Mr. Dooley was the Abe Martin, the Pogo, the thick-broqued philosopher of his day. In 1910, Mr. Dooley spoke his piece on the open shop in the Commercial Telegraphers' Journal. Wage scales have changed, but it is still a timely viewpoint, and we reprint it for the readers of 1952.

"**W**HAT is all this talk that's in the papers about the open shop?" asked Mr. Hennessey.

"Why, don't ye know?" said Mr. Dooley. "Really, I'm surprised at yer ignorance, Hinnessey. What is the open shop? Sure, 'tis a shop where they kape th' door open t' accommodate th' consthant stream of min comin' in t' take jobs cheaper thin th' min what has th' jobs. Tis like this, Hinnessey—suppose one of these freebarn Amerycan citizens is wurkin' in an open shop for the princily wages of wan large iron dollar a day of tin hours. Along comes another freebarn son-of-a-gun, an' he sez t' th' boss, 'I think I could handle th' job for ninety cints.' 'Shure,' sez th' boss, and th' wan-dollar man gits th' merry, jinglin' can, an' goes out into th' crool wourd t' exercise his inalienable

reights as a freebarn Amerycan citizen and scab on some other poor divil.

"An' so it goes on, Hinnessey. An' who gits th' benefit? Thru, it saves th' boss money, but he don't care no more for money than he does his reight eye. It's all principle wid him. He hates t' see min robbed of their indepindence. They must have their indepindence, regardless of inanything ilse."

"But," said Mr. Hennessey, "these open shop min ye minshun say they are fur th' unions, if properly conducted."

"Shure," said Mr. Dooley, "if properly conducted. An' there we are. An' how would they have thim conducted? No strikes, no rules, no conthtracts, no scales, hardly iny wages, an' dam few mimbers."

Notice: To All Local Broadcasting and Recording Unions



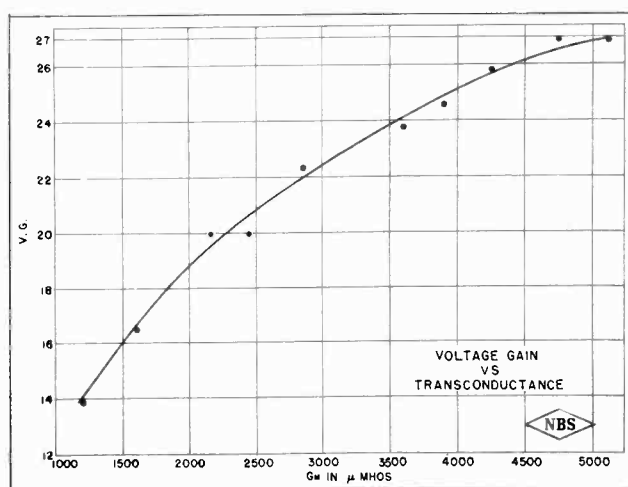
Special small labels are now available for the identification of recordings and will be supplied, without charge, to all local unions for distribution to their contractors. The usual Constitutional provisions apply (See the booklet entitled "Firms Using Official Labels," published by the IBEW). Serially numbered, these labels offer a positive identification of discs and tapes. Address inquiries and orders to the International Secretary.



ABOVE: Making a failure-prediction test on a military radio receiver at the National Bureau of Standards. The connector from the experimental prediction-test unit (right) is simply plugged into the connector that has been added to the slightly-modified receiver. It then takes only a few seconds to make an incipient-failure check by rotating one of the multi-point selector switches (large knobs); the alarm light (near left knob) flashes on if any of the stages of the receiver have deteriorated below a safe level. The tests method relies on detecting decrease of tube transconductance, but provision is also made (small switches) for measuring voltages and currents and for sensing capacitor leakages.

RIGHT: Curve showing actual measurements of gradually decreasing test voltage, corresponding to gradually decreasing gain, for one amplifier stage in a receiver at NBS. Over-all performance was not measurably affected by the decreasing performance of this stage until the test voltage had fallen to little more than half of its original value; by this time the deteriorating stage was almost ready to cause complete receiver failure.

Predicting ELECTRONIC FAILURES



BROADCASTING and recording engineers have long needed a highly reliable testing device for predicting failures of tubes and other equipment components. Being able to detect incipient failures of equipment before they affect over-all performance would be of value to any studio or transmitter staff.

To develop such a device, many electronics research laboratories have conducted special studies. Researchers hope to produce instruments which will permit quick and easy failure-prediction checks by both skilled and unskilled personnel.

Under the sponsorship of the Office of Naval Research, J. H. Muncy of the National Bureau of Standards engineering electronics laboratories has been conducting some of the most recent investigations into this question of predicting failures. His results have been promising.

A technique has been evolved experimentally in which a maintenance man simply plugs a portable failure-prediction unit into the slightly-modified equipment to be checked and turns a multi-point selector switch; a red light flashes on to identify stages or components

that have deteriorated below safe levels and have become prospective causes of equipment failure. In accelerated-aging experiments on a military radio receiver, the Bureau has been able to predict most failures many hours before they occur.

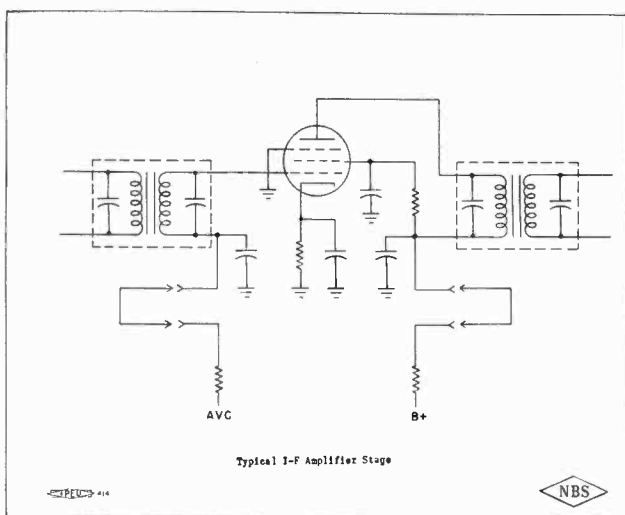
As applications of radio and electronic equipment continue to increase in extent and importance, problems of maintenance and reliability become increasingly serious. This is particularly true of military electronics equipment. In addition to its importance for military communications, electronic equipment is relied on more and more by the Armed Forces for radar detection of aircraft and vessels, for the automatic aiming, firing, and detonating of weapons and missiles, and for numerous instrumentation and control applications. The inevitable complexity of much of this equipment increases the danger that failures of components will cause failures of essential equipment at critical times. Although much progress has been made toward better electronic dependability, particularly through improved-quality components, the dependability of present-day electronic equipment still leaves much to be desired.

In some large and high specialized electronic installations, such as the Whirlwind computer, valuable means for automatically detecting marginal stages have been built into the equipment. Until now, however, very little study seems to have been made of the practical possibility of detecting incipient failures by means of simple routine checks using portable test equipment.

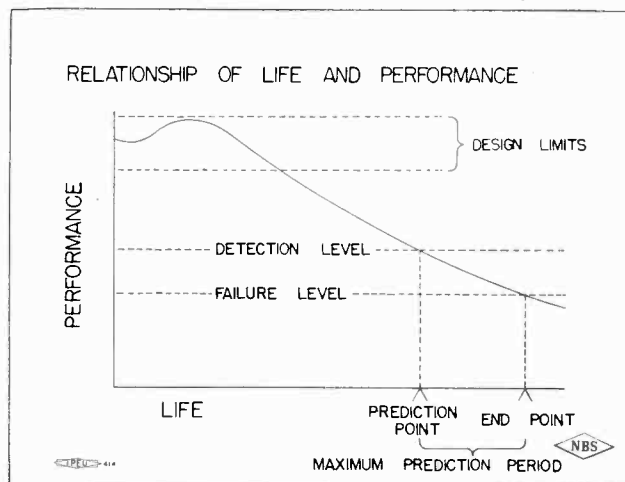
Failure of electronic equipment to function properly may be caused either by sudden or by gradual failure of a tube or other component. Although improvement of quality seems to be the only way to reduce sudden failures of components, surveys have indicated that at least half of all equipment failures are produced by gradual failures of components. The NBS work has been concerned with practical means of spotting these gradual failures before the equipment becomes inoperative.

Multi-stage Testing

In multi-stage equipment it is impossible in general to detect such incipient failures by input-output performance measurements. This is because the tolerances of an over-all measurement will usually mask the performance decrease of one stage that may precede failure in that stage. Daily variations in measured gain of a typical piece of equipment are greater than the change caused by the gradual deterioration of one tube in one stage; as the tube continues to deteriorate, the time at which impairment of over-all performance becomes detectable may practically coincide with the time at which over-all failure occurs. Successful failure prediction therefore requires that the condition of each important stage or small group of stages be established individually.



Typical i-f amplifier stage, showing how grid and plate leads were broken in order to make failure-prediction measurements. Simply by making various connections to these leads—both of them at ground potential with respect to the receiver signal—it is possible to detect changes in transconductance and in various resistors and capacitors. In the NBS experimental equipment, connections between the prediction test set and the receiver under test were quickly made by means of plug-in connectors.



Curve representative of the change of performance level with service life of an electronic component. A curve of this type is applicable to many types of component—tubes, resistors, capacitors, or complete subassemblies. After some performance fluctuations that may be either upward or downward, the component gradually deteriorates until it reaches the failure level. The National Bureau of Standards investigation has shown that it may be practical to improve the dependability of electronic equipment by providing for quick semi-automatic checking routines that will detect, before they can cause failure, components that have deteriorated below a safe level (detection level).

The designer of electronic equipment must allow certain design tolerances for the performance of any type of component, whether tube, resistor, capacitor, or complete subassembly. Component performance may vary both positively and negatively with time, and the designer must allow for these drifts as well as for initial spread. In equipment designed for reasonably long life, a component can gradually deteriorate a great deal before it reaches the level of minimum acceptable performance (the failure level). It is the gradual nature of this deterioration that gives rise to the possibility of predicting failures long in advance.

Most Common Cause

Tube failures are by far the most common cause of electronic equipment failure, and the experimental NBS failure-prediction system depends primarily on sensing decrease in tube transconductance of critical stages. This is done by operating the tube as a resistance-coupled amplifier, applying a 3,000-cycle signal, and sensing whether the voltage gain has fallen below a predetermined limit. This test also detects changes in components other than the tube if the changes are such as to affect the gain of the stage. In addition, provision is made for checking capacitors for leakage, and for voltage and current measurements, although in the equipment studied practically all the failures have been tube failures detectable by the voltage-gain check.

The military receiver selected for experimentation at NBS, an 18-stage guard-channel receiver, required only slight modification to adapt it to the failure-prediction system. The circuits were first examined for sensitivity

to weak and gassy tubes. The sensitive stages were the r-f amplifier, first mixer, high i-f amplifier, second mixer, two stages of low i-f, two crystal oscillators, and two frequency multipliers. Insensitive stages were signal and avc detectors, audio and ave amplifiers, series and shunt noise limiters, and avc gate. Wiring was modified sufficiently to permit checks on the 10 sensitive stages. Changes consisted chiefly of provision for breaking grid and plate return leads to permit insertion of an audio signal and measurement of gain. Necessary connections were made to a multi-point connector into which the plug from the failure-prediction unit could be inserted. Circuit changes entailed use of only about 7.5 per cent additional components, mostly capacitors and r-f chokes; wiring and parts were all fitted without difficulty into available space in the receiver.

Testing Adjustments

The experimental NBS prediction test unit includes a 3,000-cycle oscillator, voltage-sensing circuits, a leakage detection circuit, and an alarm light. As the main selector switch is rotated to check the gains of the various stages of the receiver, different predetermined levels of audio signal are applied to the grid of each stage. Each input signal is preadjusted so that if the gain of the stage has changed by more than a safe

amount the voltage-sensing circuits will actuate the alarm light. After the test unit has been plugged into the receiver, it takes only a few seconds to rotate the selector switch and discover any weak stages. This switching could be speeded up and made automatic by means of stepping-type switches. A separate 3-position switch on the test unit permits capacitor-leakage sensing and voltage-and-current sensing, in addition to the gain sensing. For field use the unit could be made quite compact and portable.

For laboratory evaluation of this failure-prediction system, 1,000-hour accelerated-aging tests were run at NBS on six of the modified receivers. To accelerate failures, temperatures of components were cycled between 10°C and 120°C with a 15-minute total period, voltages were maintained at 15 per cent above design values, and switching transients were simulated by periodically raising plate voltages to 150 per cent of normal for one second. Since the emphasis was upon producing gradual failures, vibration and shock were not included. Prediction checks were made at 5-hour intervals.

A total of 79 tube failures occurred in the six 11-tube receivers during the 1,000-hour test period. Sixty-five of these failures, or about 80 per cent, were of a gradual and predictable nature—either low transconductance or gassiness—while the other 14 were caused by unpredictable open heaters (7) or shorts (7). The fact that other tube-failure analysis studies have shown only about 50 per cent of failures to be gradual is probably attributable largely to the presence of vibration and shock. Six of the 14 opens and shorts at the Bureau occurred during one 60-hour period during which heaters and plates were cycled one minute on and one minute off; the other eight were spread over 940 hours.

Reliability of Tests

Fifty-eight of the 65 predictable tube failures were accurately predicted many hours before the receiver failed. Of the seven predictable failures not successfully predicted, two were in stages not being checked, four were in a single stage where parasitic oscillations interfered with measurement, and one was masked by the change in value of an overloaded resistor. Failures of components other than tubes were negligible and do not warrant any conclusions as to predictability.

The principles of measurement on which the NBS failure-prediction work has been based are not new, and many better failure-prediction systems can undoubtedly be devised; yet until now very little has been done toward developing practical techniques for semi-automatic checks to detect incipient failures. The success of the experimental work at NBS suggests that provision for simple failure-prediction routines for the maintenance of important electronic equipment deserves the serious attention of design engineers.

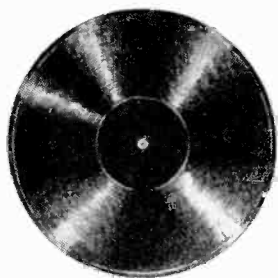
AND HOW LONG IS A PIECE OF STRING?

The chief engineer wanted to know how long a cable was, after installation, and the supervisor had only a hazy recollection of its length. It couldn't be measured accurately because it was installed in a piece of conduit running through the wall of a building and the conduit had a number of turns in it which were concealed by the wall. Finally, after much head-scratching, the supervisor came up with the following facts:

Ten inches of cable protruded from the conduit, on the "inside" of the building. The length of the cable which protruded from the conduit on the outside wall was equal to the length of the cable hanging on the inside wall surface plus one-half of the cable length which was covered by the conduit. The length of the cable covered by the conduit was as long as the total length of the two protruding ends. How long was the cable?

ANSWER ON PAGE 16





By Emory Cook

Sound Engineer and Head of Cook Laboratories

HIGH FIDELITY—Does It Exist?

HIGH fidelity" as a term has existed for over 15 years in the public eye, yet with very few exceptions it has never been heard by the public ear. This unfortunate misnomer has been applied to various equipment and records until it is now a banal expression. There is a corresponding danger that the continued search for high fidelity may also become banal as writers of advertising copy continue with their race for adjectives.

If a discriminating listener is to assemble a high fidelity unit for playing records, he has almost no alternative: Among all the generous claims and specifications there are only one or two acceptable pick-ups, amplifiers and speakers from which to choose. Cost is by no means any index of performance.

There can be no question as to what constitutes high fidelity, and there is only one way to appreciate fully the fearful discrepancy between reproduced music and music. Go to a concert. Listen there for the velvety-smooth complexion of the overtones of the string section; hear the abrupt rubbery sound of the rosin on the soloist's bow; commit to memory the make-up of the piano note, especially the "attack," or beginning of each note. Feel the physical sensation of bass in *pitch*, not *boom*. Listen, if you can, less for enjoyment this time, and more for memory—and for days afterward you will be an expert judge of high fidelity.

Approach to Listening

But we do not listen to music with the mind of an acoustic engineer, or as a rarefied mathematical exercise. Rather we listen to it for its emotional or spiritual impact; and, to be effective in that direction, the reproduction must lead us back in fancy to some concert hall or auditorium—or night spot—where once we heard it alive and in the flesh, and where perhaps also lies a memorable experience for association.

For every subject to be recorded there is an acoustical natural habitat. With some things the listener wants

to imagine the performer in the room with him, over there in the corner, where the speaker is located. If such a record originated in a large "live" studio he is prevented from imagining this because he knows that his living room does not sound that "large."

Taking the opposite extreme, suppose a great carillon is to be recorded. Is the microphone to be rigged in the tower with the bells, or in a shaft below, or anywhere else near by? No, indeed! It must be placed down in the street, perhaps several blocks away, so that the listener may imagine that his house and living room are down the street from the church; or, perhaps, as he listens he may dream that he is walking along the way to church as it plays, for the acoustics then permit him this flight of fancy.

Studio Recordings

Occasionally recordings are made in a church or concert hall, but more often they will be done in a modern studio. Modern studios have evolved to the point where they are unnatural places in which to originate sounds. There is an over-emphasis on appearance and style, and year after year engineers have fussed with them until their acoustics are "flat."

When a studio is flat it will take just as long for a high-pitched piccolo note or violin overtone to die down echoing and bouncing around the walls and ceiling as it will for the low-pitched tones of the bass viol or the organ pedal note. For business reasons, the sales engineer who represents the manufacturer of acoustic materials has a motive for this refined artificial treatment, for it takes a great deal of very expensive acoustic building material and costly engineering talent to contrive an acoustically flat studio.

But there is no law of engineering or nature that says they should be flat. Nobody except engineers and entertainers has ever heard music first-hand in flat studios. The sound is harsh and unnatural, as anyone knows who has listened to serious music emanating from them via radio during the past decade.

As a matter of fact, it costs very little more to produce a high fidelity record. The tools and methods for making them are available today. Great performances

This article, written by the head of a leading recording and electronics firm in Connecticut, is reprinted with permission from the "New York Times."

and performers are passing by, but the documenting of their art is geared up to produce no higher a fidelity than is necessary for today's machines and markets. Yet the primary function of a serious record in the first place is to preserve for future years of enjoyment a performance which the listener wants and needs. Nevertheless, the inertia of change and improvement will not be overcome until it becomes necessary to make better

records in order to continue selling records.

We must have not only all the best in equipment and operating techniques for making records. In addition we need producers, guiding hands who recognize that there is also a philosophy for recording, and that certain great and obvious truths are in danger of being trampled underfoot and forgotten in the stampede of modern semi-fidelity recording.

Irate Video Owner Solves a Pressing Problem

"Broadcasters need no longer worry about popularity ratings
... They can just go around and count the picture tube pieces"

BY JACK GOULD

POLICE of West Hempstead, L. I., have taken away the revolver of Frank P. Walsh, electrician and night industrial guard, who on Sunday evening fired a bullet into the picture tube of his receiver because he couldn't stand the noise any longer. They should give him back his gun; his work has barely started.

Mr. Walsh, who was trying to get some sleep in an upstairs bedroom, drew a bead on his console just as the Abbott and Costello program got under way on Channel 4. As anyone who saw the program can attest, Mr. Walsh is a man of discernment.

No doubt it will be only a matter of days before the Russians lay claim to Mr. Walsh: the genius who uninvented television. His public-spirited act opens new vistas for the television industry. No longer need the broadcasters worry about popularity ratings or how many receivers are tuned to a show. They can just go around and count the pieces.

Use for Focus Control

According to the latest communiqué from West Hempstead, Mrs. Walsh believes there may be no more TV in her house. If the Federal Communications Commission isn't joking about operating in the public interest, convenience and necessity, they'll move immediately to keep Mr. Walsh in a fresh supply of receivers. At least he found a use for the focus control.

If the cops don't give him back his rod, however, Mr. Walsh's singular contribution to the national culture will be largely wasted. With just a modicum of effort there's no reason why cathode homicide can't supplant canasta. The first step is for the newspapers to stop listing program highlights. Thanks to Mr. Walsh, they may now be identified as "targets for tonight."

Mr. Gould, an able entertainment critic, suggests possible radio and TV victims of justified mayhem to his readers. Reprinted from the "New York Times."

Mr. Walsh has not yet detailed what other programs are scheduled to attract his fire, but there's no reason why the individual viewer can't make his own nominations. Some possibilities readily come to mind:

Possible Victims

The announcer who insists that a cigarette is mild, milder or mildest.

All middle commercials.

English films that look as if they were taking place at midnight in a cellar.

The synthetic excitement of the masters of ceremonies on give-away shows.

The after-midnight programs that are straight commercials occasionally interrupted by a movie.

All entertainers who close their program by saying, "Thank you for having us in your home."

Sports announcers who close their "talkathons" by saying, "We hope you enjoyed this as much as we enjoyed bringing it to you."

Comedians who blame their gag writers.

Anyone singing "Wish You Were Here."

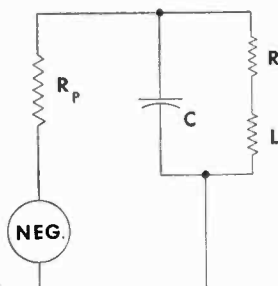
Surely, Mr. Walsh deserves everyone's encouragement. Don't you have a little list?

THIRTY YEARS AGO, this month, November 11, 1922 a remote control pick-up of the opera "Aida" from the Kingsbridge Armory, New York, was the first opera to be broadcast in this manner. Today, opera from the stage of the Metropolitan Theater in New York City is routine for network technicians.

On December 11, a theater television net will carry the metropolitan's "Carmen" from the New York stage, marking another milestone for opera and for theater TV.

TECHNICAL NOTES

MOST of you know that we use crystal controlled oscillators in transmitters because the many variables in other types of circuits cause of frequency variations far beyond the limit of legal frequency tolerance. Did you ever stop to calculate the proof?



The diagram shows the equivalent circuit of a tuned-plate oscillator. The inductance is 100 microhenries with an effective resistance of 50 ohms. The capacitance is 100 micromicrofarads and the plate resistance is 9500 ohms.

First find the resonant frequency, neglecting the plate and coil resistance; then calculate for the resonant frequency including the plate and coil resistance. Either good log tables or full arithmetical computation must be used—slide rule calculations will not show the different frequencies in this case.

$$\begin{aligned} f &= \frac{1}{2\pi\sqrt{LC}} \\ &= \frac{1}{6.2831853 \times \sqrt{100 \times 100 \times 10^{-18}}} \\ &= \frac{10^7}{6.2831853} = 1,591,549 \text{ (APPX)} \end{aligned}$$

Including the resistances:

$$f = \frac{1}{2\pi\sqrt{LC}} \times \sqrt{\frac{R + R_P}{R_P}}$$

The value of the second factor is:

$$\begin{aligned} \sqrt{\frac{50 + 9500}{9500}} &= 1.0026281 \\ f &= 1,591,549 \times 1.0026281 \\ &= 1,595.6 \text{ KILOCYCLES} \end{aligned}$$

The second factor in the above formula clearly shows an error of 0.263 per cent. Compare this with an International Broadcast Tolerance of 0.005 per cent!

Facts and figures taken from Professor Fischer's highly interesting book "Radio and Television Mathematics."

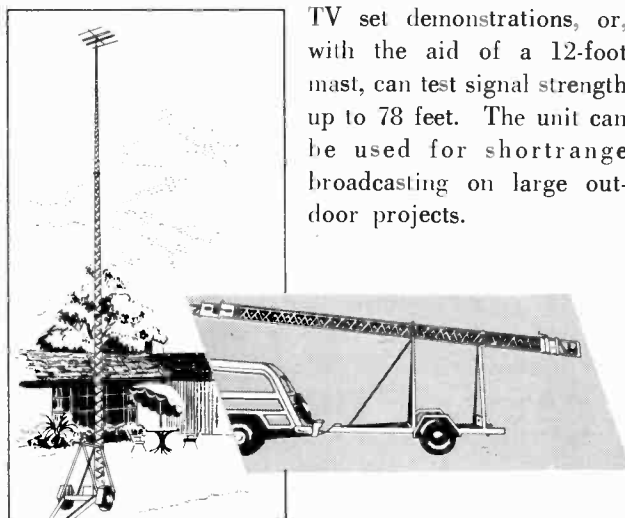
—ATHAN COSMAS, *Vice President, Local 1212.*

A Versatile, Telescoping Tower

A midwest manufacturer has produced a telescoping tower which rises to a height of 72 feet in only 15 seconds and should be a solution to many broadcasting and reception problems.

Mounted on a two-wheel trailer, this aluminum-truss unit was designed by Alprodco, Kempton, Ind., and Mineral Wells, Tex., who expect the rig to be a boon to fringe-area TV dealers and installers. The complete unit consists of three 24-foot towers that telescope together. The assembly is steadied by jacks while in use.

The tower can be used for TV set demonstrations, or, with the aid of a 12-foot mast, can test signal strength up to 78 feet. The unit can be used for shortrange broadcasting on large outdoor projects.



Aerial Surveys for Microwave

An aerial survey service to aid in establishing microwave transmission paths was announced recently by the Engineering Products Department of RCA Victor. RCA engineers and aerial navigators will provide subscribers to the new service with data and photographs compiled to form a complete analysis of any projected microwave system. Included in the survey will be general topographical details, a study of possible station sites, aerial photographs, and charts delineating the microwave paths.

The plotting of such microwave paths from planes equipped with radar, aerial cameras, and other navigational instruments was first undertaken in the establishment of television networks. The method was proved basically sound and the most accurate means of scouting possible routes prior to buying land and constructing stations.

Now RCA is equipped to expedite the laying out of both long-range and short-range microwave communication, channeling, and telemetering systems for right-of-

way users such as gas and oil pipe lines; water, gas, and electric utilities; telegraph, radio, and telephone companies; railroads, and government agencies. State-wide police radio networks, forestry, and other public services can also derive substantial benefit from the new aerial survey service.

In England Films Are Better

British television technicians have scored "turnabout" in production techniques, which to American technicians would seem impossible.

Hugo Gernsback reported in *Radio-Electronics* magazine for September that British film telecasts now far exceed in quality their live ones. One of the chief technicians of the British Broadcasting Corporation says, "We are now trying very hard to make our live broadcasts as good as our filmed ones."

In the United States, as you know, exactly the opposite conditions prevail.

The reason for this condition, according to Gernsback, is that English technicians have evolved a very high standard of technical perfection and know-how in all their film transmissions, even though their live productions lag and lack many facilities which are available in U. S. studios.

Television standards in Great Britain are different from their American counterparts, too. Where we have 525 lines and 60 fields per second in our transmission, in England the standard is 405 lines and 50 fields.

Pictures-on-Tape Expected

A top experimental laboratory claims its system of recording pictures on magnetic tape for television is "an accomplished fact," reports *Broadcasting-Telecasting* magazine. Under development for the past two years by the electronics division of Bing Crosby Enterprises, the process is "90 per cent perfected" and will be ready for demonstration in a few weeks.

Technical Notes Needed

TECHNICAL NOTES is a section of "shop talk" by and for the readers of THE TECHNICIAN-ENGINEER. It is open to your diagrams and your own solutions to engineering problems. In recent issues the editors have used items of general interest, but they are anxious that you take over. Send us your own technical articles. Share your solutions and ideas with brother engineers. The mailing address for manuscripts and illustrations: Editor, THE TECHNICIAN-ENGINEER, IBEW Building, 1200 Fifteenth Street, N. W., Washington 5, D. C.

One Moment Please



Chief Engineer Gus Czaplak of WJLL, Niagara Falls, N. Y., was ready to turn the station transmitter over to the birds recently.

It was a peaceful Sunday evening, and WJLL's programming was emanating from the transmitter as it did each Sunday from 7 p. m. till sign-off time. Music was flowing sweetly from the turntable during a 15-minute transcribed show, when in flew a pigeon to perch on the table's playing arm.

When the engineer made a grab for the visitor, he missed the bird and sent the arm scratching across the grooves instead.

Again, as Czaplak was about to turn the recorder switch after fading the show for the taped sign-off, the pigeon alighted on the feed reel, fouling up the tape.

WJLL was off the air for two and a half minutes. The friendly pigeon became a guest of the SPCA.

EDITOR'S NOTE: Every station has its tales of last-minute woe . . . unexpected breaks of silence . . . listener complaints. . . . Send them to the **TECHNICIAN-ENGINEER**. We'd like to have the best ones illustrated and passed on to the membership. Mail them to The **TECHNICIAN-ENGINEER**, International Brotherhood of Electrical Workers, 1200 Fifteenth Street, N. W., Washington, D. C.

Station Breaks



New Contracts in Chicago

New contracts have been signed with two Chicago stations by IBEW Local 1220, with substantial raises involved in each. WGES agreed to a \$10 weekly raise for engineers now, raising the top from \$110 to \$120, and another \$5 per week one year from the effective date of the new contract, which is November 20. Station also agreed to reduction of the escalator clause from four and one-half years to two.

Zenith FM station, WEFM (FM) signed a one-year contract which provides that all technicians receive a \$7 per week increase, reduction of the escalator clause to three years, and a fourth week vacation for employees with 10 or more years of service. Zenith negotiations were handled by Ted Leitzell, firm's public relations director, who also acts as station manager, and by Joseph Wright, company attorney. IBEW was represented by Walter Thompson, president of Local 1220.

Publication Errata

In spite of all we do to prevent errors in the text as well as lists of addresses, etc., errors occur in the **TECHNICIAN ENGINEER**, and the October issue was no exception.

The listing for Local 1216, Minneapolis-St. Paul, Minnesota, should be corrected to read:

"Bernard J. Renk, Bus. Mgr., 3239 41st Avenue, South, Minneapolis 6, Minnesota."

The address for International Representative Russell D. Lighty should read: "R. F. D., Lafayette, New Jersey. Phone Newton, N. J., 992-M."

There is an additional International Representative assigned to the Ninth Vice-Presidential District, to the States of Oregon and Washington:

"W. A. Smith, Care of Local Union No. 77, 317 Wall Street, Seattle 1, Washington."

Except for these changes, and the fact that we referred to election day in several instances as being on November 2nd (we hope nobody got there early and had to wait until the 4th), the October issue was relatively accurate.

CBS Television City

Monday, November 17, marked the climax of a three-day dedication of CBS Television City in Hollywood, complete with parades and a coast-to-coast telecast.

NBC Signs for Inaugural

NBC has signed a sponsor for the Presidential inauguration in Washington, January 20, and two other networks—ABC and CBS—are reported to have negotiations in progress.

General Motors will sponsor a four-hour telecast of the parades and ceremony and a two-hour broadcast, as well. Both radio and TV coverage will start at 11:30 AM; NBC radio will continue until 2:30 PM (EST) and TV will extend until 4:30 PM (EST). The network will telecast and broadcast the actual swearing-in ceremonies, followed by President's speech at the east portico of the Capitol, as a public service.

GM sponsorship will cover the Presidential procession from the White House to the Capitol, the return cavalcade from Capitol Hill to the White House, and the President's review of the inaugural parade.

WLWT Offers Tower Use

Last month, WLWT (TV) Cincinnati offered the Greater Cincinnati Educational Foundation use of its tower for educational telecasts.

Tower use, if technically feasible for the Foundation, would save that organization about \$100,000. Although both WLWT and the proposed educational TV station would use the same tower, no engineering problems are anticipated.

Local 1217 Rotates Meetings

Until recently, Local 1217, St. Louis, Mo., held its regular meetings on Friday night. It has now amended its by-laws to permit rotating meetings to a different night each month. The November meeting was scheduled for a Monday; the December session is set for a Tuesday; and so on. This follows the suit of many other IBEW broadcasting locals, giving members who work nights a chance to attend meetings.

Answer to Puzzle, Page 11.

How long is a piece of string?
Eighty inches.

ALEXANDER BROWDY
1962 STEARNS DR
LOS ANGELES 34 CALIF
45