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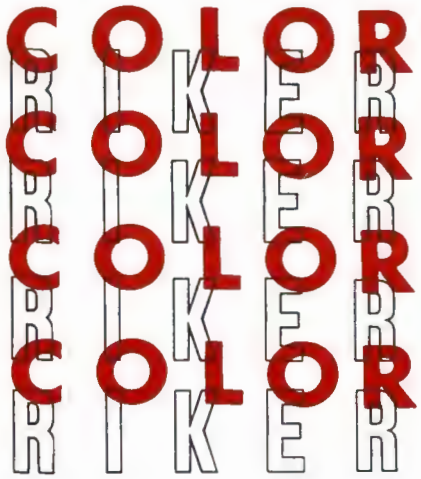
Broadcast Engineering

the technical journal of the broadcast-communications industry

seven years of broadcast technology . . .

7-YEAR SUBJECT-REFERENCE INDEX

. . . starts on page 31



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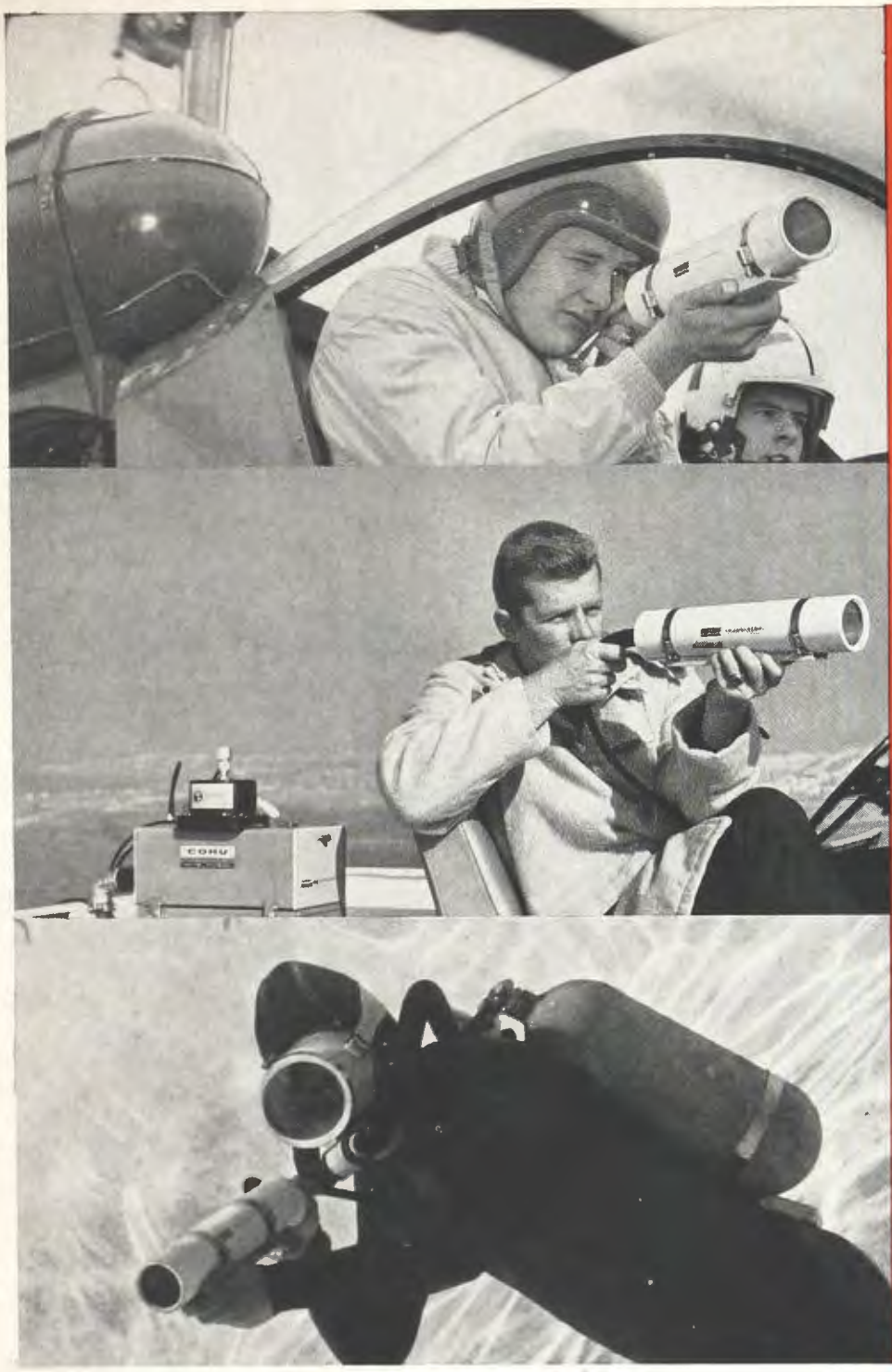

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the technical journal of the broadcast-communications industry

®Broadcast Engineering

Volume 8, No. 1 **January, 1966**

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For almost seven years, BROADCAST ENGINEERING has been the technical journal of the broadcast industry. An index covering all issues from the first through December 1965 begins on page 31 of this issue.

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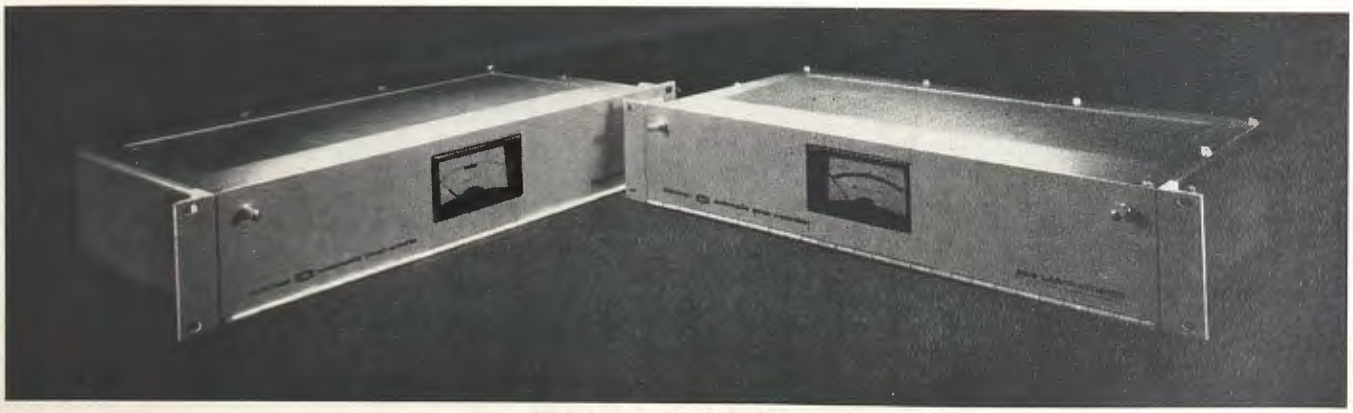


Circle Item 3 on Tech Data Card

LETTERS
to the editor

DEAR EDITOR:

Your article "Forty-Five Years of Broadcasting" (November 1965 BROADCAST ENGINEERING, page 20) was very interesting. I believe, however, that the chemical rectifiers were made of aluminum and lead in a borax (or it may have been ammonium sulphate) solution. WDAJ and my ham station, 9BZK, here in Parsons used this system in the early 1920's.

Four others and I operated WBAA, West Lafayette, Indiana, from 1925 to 1929. We used double-button carbon microphones energized by storage batteries. Storage batteries also supplied filament current for the two 204-A oscillators and two 204-A modulators. The transmitter employed Heising modulation. I had a second-class commercial ticket at WBAA. The only difference from a first-class license was the code-speed requirement, 13 or 15 words per minute instead of 20 words per minute.

PAUL V. TIERNEY

DEAR EDITOR:

It's probably just a typographical error, but in the article "TV Transmitter Proof of Performance" (November 1965 BE, page 12) the —35-db figure for FM noise in paragraph 1, page 13, should be —55db.

EUGENE E. KITSMILLER
Transmitter Supervisor,
KCTO, Denver

You're right, Gene, it was a typographical error. Other readers noticed it, too, including author Finnegan, who points out the following other errata in the article as it was printed:

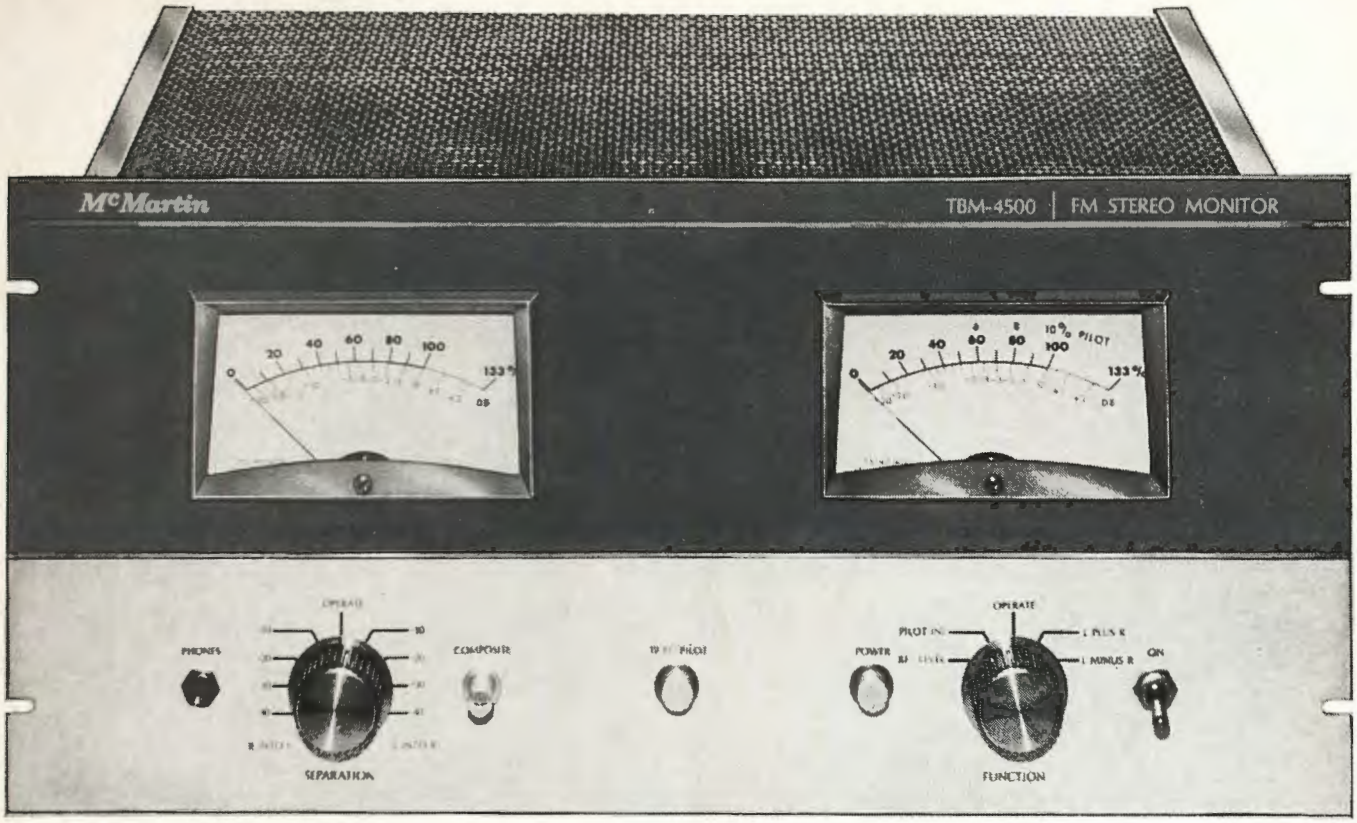
Also in the paragraph on AM noise measurement, the word "peak" was omitted; the DC voltage recovered from the detector is proportional to the peak voltage of the FM carrier. Then the noise meter is calibrated with an AF voltage having this same peak voltage; a meter calibrated in rms values would indicate .707 of this voltage.

In Fig. 1, the level at the preamplifier output should have been —9db, not —90db.

One paragraph was omitted: For color stations it is important that the response 3.58 mc below carrier be down at least 42 db. The carrier should be modulated with a 3.58-mc sine wave at normal level, and a field-strength measurement should then be made. In the point- by-point method of measuring response, this measurement is obtained automatically, but the sweep method is not sufficiently accurate—a separate measurement must be made.

The author also adds this information: While envelope delay is not normally measured as such, there is a method for checking it at the station level. A square-wave signal can be fed through the

• Please turn to page 46



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FM-250CS	250 watts	50-220 mc
FM-1G	1,000 watts	87.5-108 mc
FM-3G	3,000 watts	87.5-108 mc
FM-5G	5,000 watts	87.5-108 mc
FM-7.5G	7,500 watts	87.5-108 mc
FM-10G	10,000 watts	87.5-108 mc
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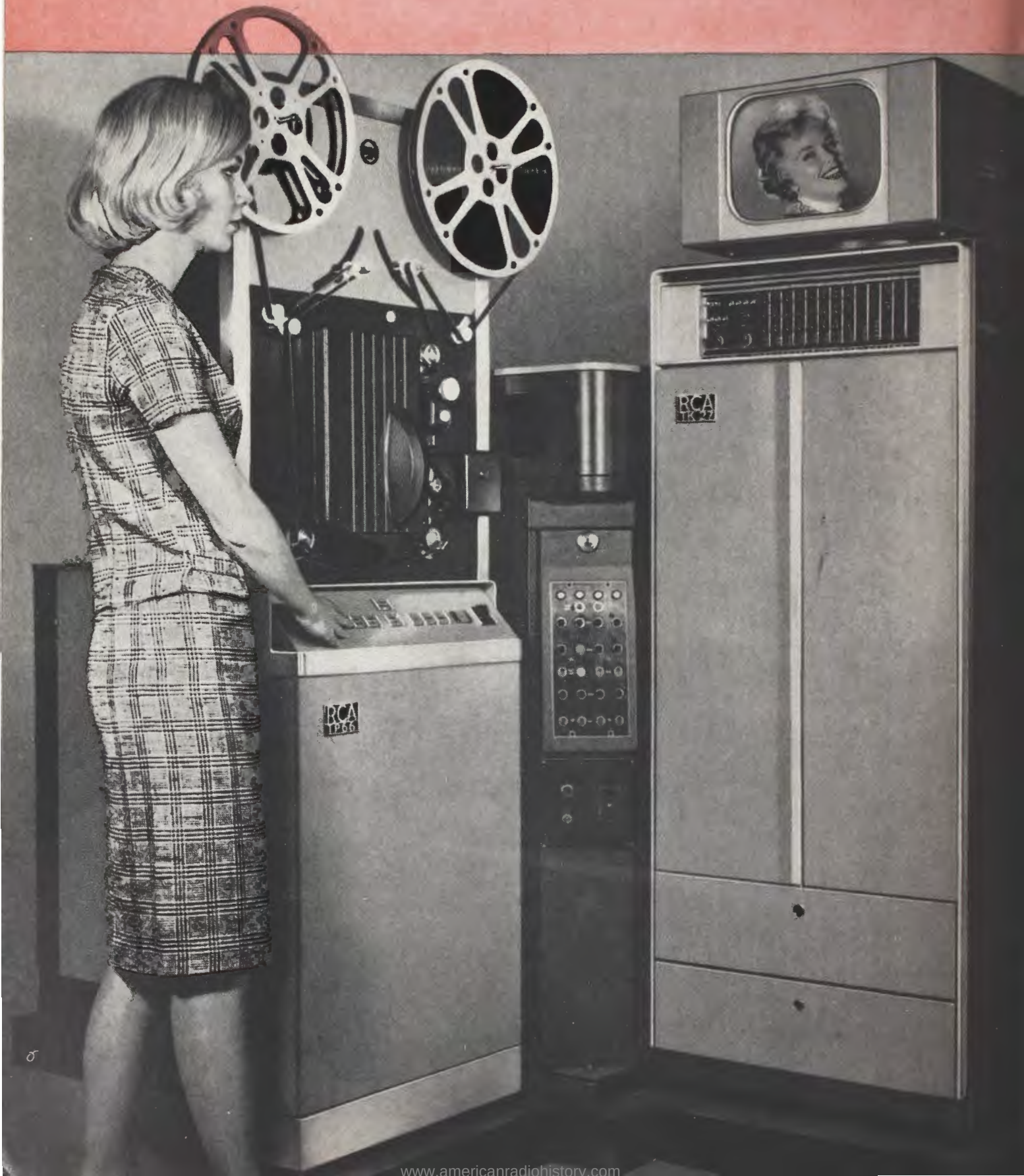

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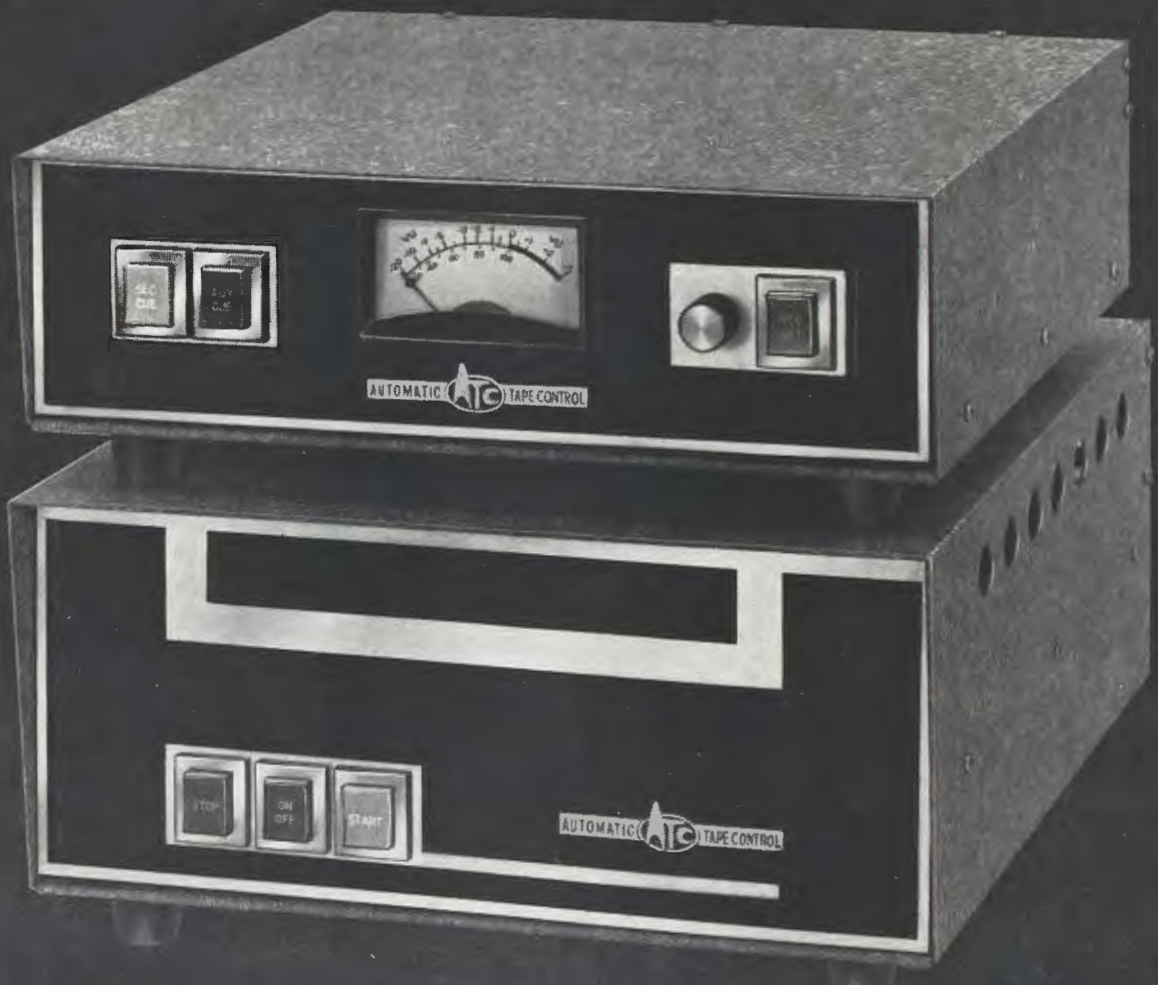

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QUARTZ-IODINE LIGHTING

by Patrick S. Finnegan, BE Consulting Author, Chief Engineer, WLBC AM-TV, WMUN FM, Muncie, Indiana — A new type of incandescent lamp is now available for studio lighting.

For many years, the majority of television-studio lighting has been supplied by incandescent lamps. Although these lamps generate more heat than other types, the size of fixtures required and the ease of dimming have led to their popularity. Such lamps do have their limitations, however. The filament deteriorates and causes blackening of the glass due to tungsten deposits. The high-wattage lamps require fixtures that contribute to reduced efficiency. Light output drops off as much as 25% over the life of the lamp, and the color temperature can fall as much as 300°K.

Quartz Lamps

The quartz-iodine lamp has undergone rapid development in the past few years, not only for television lighting, but also for general lighting. Basically, this lamp is an incandescent lamp with a tungsten filament, quartz instead of glass for the envelope, and a very small amount of iodine enclosed in the envelope.

The problem of reduced light output and blackening of the envelope in regular incandescent lamps is due to the tungsten filament. While the filament is being operated at its normal temperature, small particles of the tungsten flake off, migrate to the glass envelope, and are deposited there. This process continues until the filament is worn away and fails.

The glass envelope limits the compactness of incandescent lamps, since glass cannot withstand the high temperatures close to the filament. Quartz, however, can withstand much higher temperatures than glass, and with the use of quartz, a compact lamp is possible.

Lamp researchers discovered that iodine, if vaporized, could prevent the tungsten particles from blackening the glass. Its use is not possible in regular incandescent lamps because the temperature required to vaporize the iodine would also melt the glass. The envelope in a quartz lamp, however, operates above 500°F, and the iodine can be vaporized.

During operation of the quartz-iodine lamp (Fig. 1), the tungsten filament is heated to its normal temperature. Small particles of tungsten migrate to the envelope, as is the case in any incandescent lamp. The iodine vapor in the lamp combines with the tungsten particles, and when the lamp is turned off, the combined tungsten particles and iodine vapor return to the

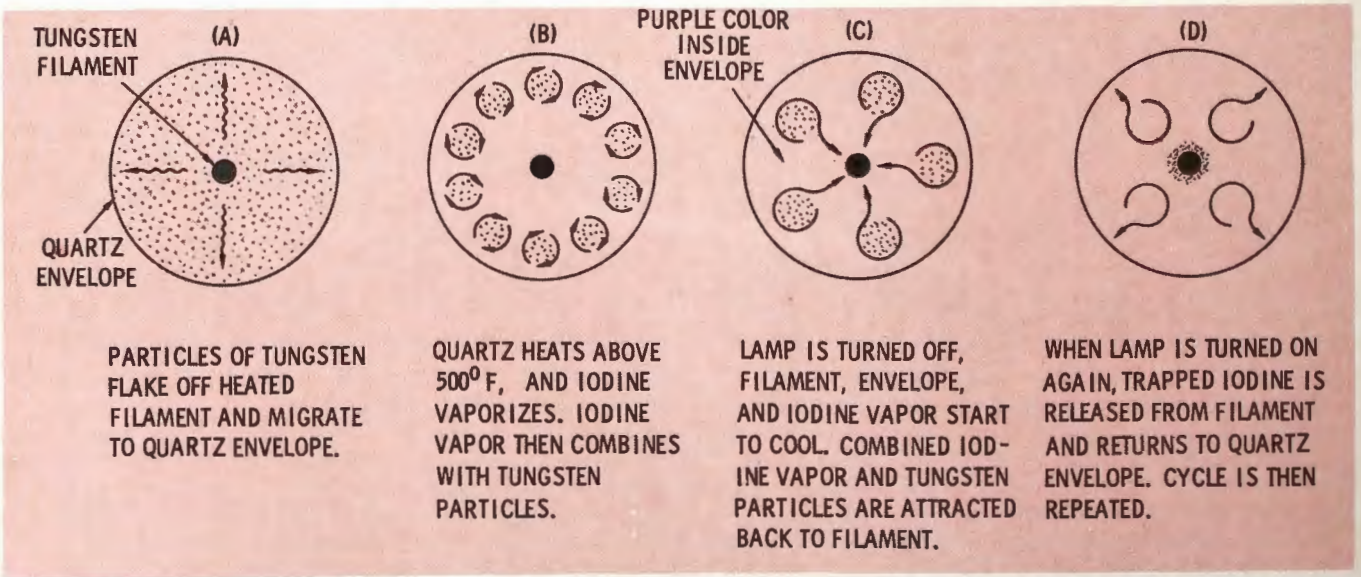


Fig. 1. This cleaning cycle in the quartz-iodine lamp contributes to its increased life and relative uniformity of light output.

filament. When the lamp is again turned on, the hot filament releases the trapped iodine, it returns to the quartz, and the cycle begins again. This "cleaning cycle" continues until the lamp burns out.

Since the iodine vapor returns the tungsten particles to the filament, blackening does not occur, and the transmission of light through the quartz is not diminished. Also, there is a relatively small reduction of color temperature and light output from the filament, and the lamp life is extended. The deterioration of light output is in the order of 3% over the life of the lamp, compared to about 25% for a regular incandescent lamp.

Whenever a quartz lamp is turned off and begins to cool, a light purple color can be seen within the envelope. This is the vaporized iodine; the color disappears after several minutes, and the inside of the lamp becomes clear as before.

A word of caution about the handling of quartz lamps should be mentioned: They should never be touched with the bare hand. Some of the oils from the skin deposit on the envelope and, when heated, hasten the deterioration of the quartz. All new quartz-iodine lamps are supplied wrapped in a soft paper, and this paper should be left on the lamp until it has been installed in the fixture. Also supplied with the lamp are instructions regarding how the lamp should be cleaned if one does accidentally handle the quartz. It goes without saying that one should never touch the lamp with bare hands while it is operating, since the quartz temperature is well over 500°F.

Advantages

One of the advantages of this type of lamp is its small physical size. A 1000-watt lamp is only 4¾" long, including the mounting ends, and ⅜" in diameter (Fig. 2). A 300-watt lamp is 3⅛" long and ⅜" in diameter. Besides the tubular lamp, one manufacturer has available a sealed-beam unit rated at 650 watts. This is similar in appearance to an automobile sealed-beam headlight, but is smaller in diameter.

The small size of the quartz lamp makes possible smaller fixtures which can more effectively use and control the available output of the lamp. An economy in power is realized because fewer fixtures of lower wattage rating are needed to light a given set or studio than would be the case with standard incandescent fixtures. Small size also makes possible a high-intensity light source in a small, lightweight fixture.

The longer life span of quartz lamps contributes to economies in the cost of time and labor when making replacements. Also, a man can carry a dozen of these lamps at one time, but very few incandescent lamps. This can save many trips up and down a ladder. And, several dozen quartz lamps can be stored in the same space it takes for one large-wattage incandescent lamp (Fig. 3).

Limitations

As with anything that has many good features, there are also some limitations. The small "compact" lamps may be positioned in any manner, but the large lamps must be positioned not more than 4° from horizontal (Fig. 4) while they are burning. Fixtures designed for quartz lamps take this positioning into account.

Envelope temperatures are important; this could be a problem if dimmers are running the lamp under voltage. The envelope must be maintained at temperatures above 500°F, but the end seals should not exceed 650°F. Since the envelope operates at such a high temperature, cold drafts could cause the lamp to shatter.

When a very high-intensity beam of light is required, such as in a very large auditorium or hall, the quartz light may not be bright enough. The largest lamps currently available are rated at about 2000 watts.

Ratings

Although limited as to the maximum wattage available, quartz lamps are available with color-temperature ratings from 2900°K to 3400°K, which permits their use in color studios. The higher Kelvin ratings permit dimming practices in which the lighting director "lamps up" so that he may dim down while still maintaining a suitable color temperature. Some fixtures are available which permit the use of gelatin filters. With such a filter, the light output from a 3000°K lamp gives the same color response as that from a 3200°K lamp. Because the fixtures are more efficient, the attendant loss of light intensity can sometimes be tolerated. At the same time, lamp life is improved considerably. For example, a 1000-watt lamp rated at 3000°K has a life expectancy of 2000 hours, whereas a 1000-watt lamp rated at 3200°K has a life expectancy of 500 hours.

Fixtures

Because quartz lamps are small, their fixtures are smaller than regular fixtures. The reflectors and lenses for spotlights receive anywhere from two to three times the light that could be obtained in the past from ordinary incandescent sources. The lenses require glass with high heat resistance because they are close to the lamp; the reflectors are usually of aluminum.

Portable lights with reduced size

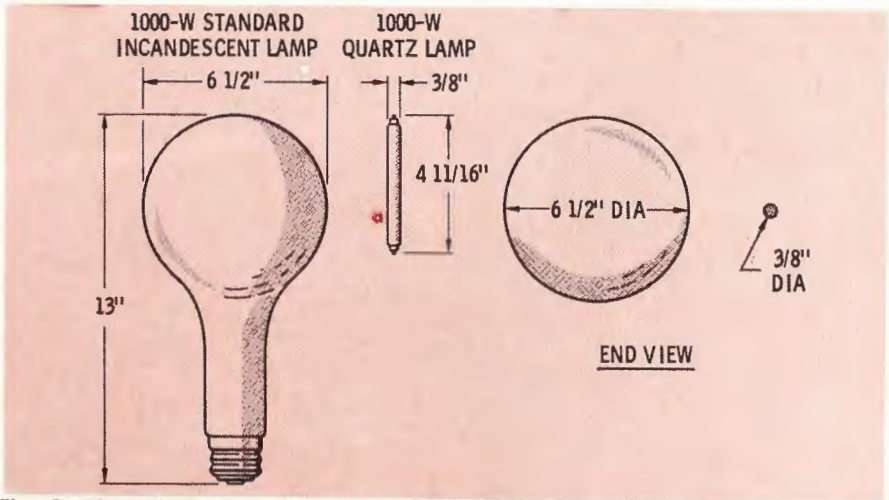


Fig. 2. Physical sizes of quartz-iodine and regular incandescent lamps compared.

and current requirements simplify remote pickups and news work. As an example, one such portable light uses a single 500-watt lamp that has a 2000-hour rating and draws only 4.2 amperes. This fixture is adjustable with a simple knob adjustment for either spot or flood. As a spot, it provides 100 footcandles at 10′ from the lamp; as a flood it provides 60 footcandles. The light pattern in flood position is a rectangle approximately 11′ high and 22′ wide. The fixture has barndoors and can provide a sharp light cutoff to prevent spillage into another area. It can also be used in the studio when a small lamp is needed. It measures 4″ x 4″ x 9″.

Ordinarily, studio floods provide a wide pattern of even lighting. (The edge of the defined area is the point where the light intensity is 50% of the maximum intensity.) A softer, more diffused light is possible with glass diffusers in front of the light. A still smoother field may be obtained with the use of frosted lamps.

As an example, the area covered by a 1000-watt rectangular flood, using a frosted lamp, is approximately 18′ wide and 13′ high at 16′ from the lamp.

Spotlights using quartz lamps are also available. One such fixture, using a 1000-watt lamp, produces 160 footcandles at the beam center at a distance of 100′.

A variety of fixtures is available: pattern projectors, follow spots, strip lights, and others used for special lighting effects. One such light, using a 1000-watt lamp and barn doors on four sides, will light an area 24′ wide 10′ from the lamp. The light field can be cut to a narrow, bright strip with well-defined edges.

Only a few types of fixtures have been mentioned here; many more are available.

Existing Fixtures

Most TV stations have a sizable investment in their present incandescent-lighting fixtures. Most will not want to scrap these units immediately to install quartz lighting. Some of these existing fixtures can be converted to quartz by the purchase of kits. Many of the conversion kits are of the small-wattage variety, but there are kits to convert some sizes of spotlights, also.

A few examples will help show the results to be expected from the modification of fresnel spotlights. A kit to modify a 500-watt fresnel spotlight includes a 400-watt quartz lamp and a complete socket assembly with reflector and 6″ fresnel lens. It costs about $27. The old base is removed from the fixture, and the new unit is installed in its place. This permits the original mechanism to be used in making the usual spot-to-flood adjustments. This 400-watt quartz-lamp arrangement gives about twice the light that was available from the 500-watt incandescent lamp. At the same time, the new lamp can be expected to last four times as long.

The same manufacturer has a conversion unit for the 750-watt incandescent lamp. The quartz fixture has a reflector and socket for the new lamp, and the whole arrangement is fitted with posts to plug directly into the old bipost socket. A new fresnel lens is provided. This conversion uses a 650-watt quartz lamp to increase the light output 50% over the old incandescent lamp.

In a 2000-watt 12″ fresnel spot conversion, there is a compromise in the hard-spot light intensity. The kit uses two 1000-watt quartz lamps of 150-hour life to replace the single 2000-watt 100-hour lamp. The light output of the converted unit shows a 56% increase in light over the original 2000-watt unit. In the hard-spot position, however, output of the new light is only 83% of the light available from the old lamp. The quartz light, however, maintains its light output with only a slight decrease over its life.

Favorable as these results may seem, remember that these are converted incandescent fixtures. When a fixture is designed specifically around the quartz lamp, it shows even better results. One such fixture, using two 1000-watt lamps, produces more light than a 5000-watt incandescent fresnel lamp, and still weighs only one lb. Still another new 12″ fresnel, using a 2000-watt quartz lamp, has double the intensity of the standard fixture modified for quartz and approximately three times as much light as a standard incandescent fresnel of the same wattage.

Conclusion

The miniaturization of studio lighting fixtures is well on its way, due in large part to the introduction of the quartz-iodine lamp. Much progress has been made in overcoming some of the limitations in the use of quartz. Along with this advance in lighting, we can expect many new lighting and production techniques to evolve. ▲

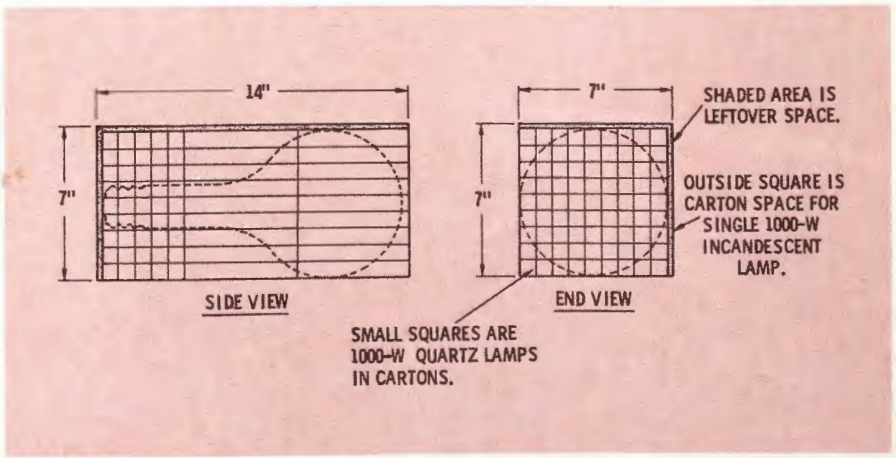


Fig. 3. As many as 207 quartz lamps can be stored in the space of one regular carton.

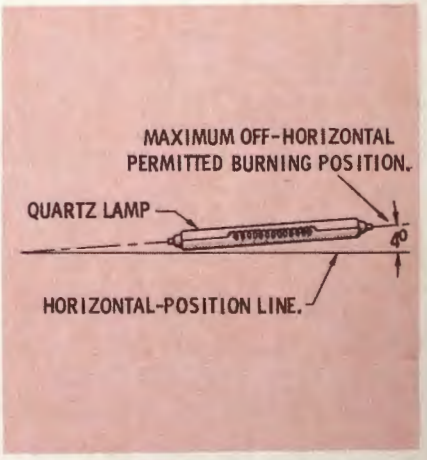
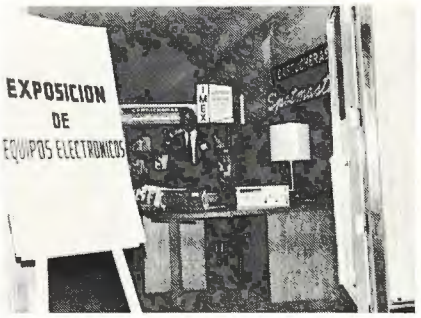


Fig. 4. The lamp must be kept horizontal.

BROADCASTERS MEET IN MEXICO

by ***Martin Taylor,*** Editor, Radio y Television



At the mere mention of Mexico, most of us conjure up thoughts of bygone vacations in a sunny land where genial people pass the major part of their workday in the shade of a cactus. Undoubtedly one would not have to search too extensively south of the border to find just such a situation. Juxtaposed to this rapidly disappearing aspect of Mexico, however, waxes a new and affluent economy which is clearly mirrored in the broadcasting industry. Currently, there are over 450 AM radio stations throughout the republic, and Mexico City alone has over 30. Television, likewise, is growing rapidly. There are 27 commercial TV stations in operation presently, and several of the largest cities boast two and three channels.

Since broadcasting is such a big business in Mexico, it is no wonder that the annual convention draws such a large attendance. During October of last year, broadcasters from all over the republic arrived in Mexico City to attend the event which is held annually in conjunction with the celebration of National Broadcasting Week. The four days of the convention were filled with feverish activity. The inaugural ceremonies were carried live by every radio station in the country and were televised by one of Mexico City's leading stations. The thirty-minute inaugural broadcast was considered to be of sufficient import to pre-empt the transmission of Pope Paul's visit to the United Nations.

In the exhibit hall, both U.S. and Mexican firms showed their wares. Ampex, Gates, RCA, and Spotmaster all had prominent displays. The reader will probably be less familiar with the following Mexican firms which also purchased space on the floor of the hall: IMEX, Ingeniería Internacional de México, Compañía Central de Grabaciones, AMSI, Industrias Radiocomunicaciones, Compañía de Ingenieros en Comunicaciones Eléctricas, and DEKSA.

The final day of meetings was closed with a speech by Mexican President Gustavo Díaz Ordaz. Although designed to provoke Mexican broadcasters to introspection, his words might well be considered by broadcasters of all lands: "Let your words be always bondsman to your ideas and your ideas slaves to the truth." ▲

THE BASICS OF LOCAL COLOR

by George C. Sitts, Eastern Regional Editor—These are some of the things to consider when adding live color.

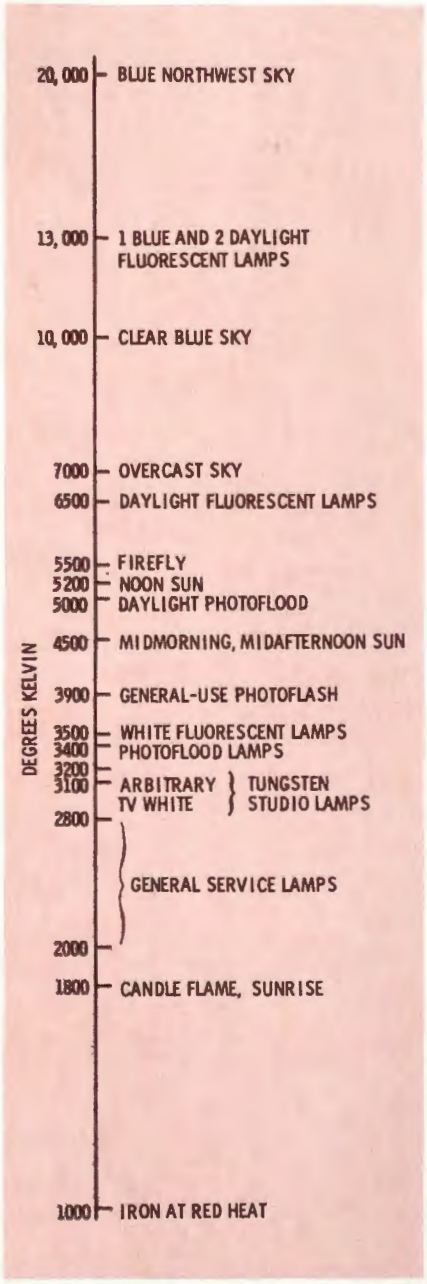


Fig. 1. Chart shows color temperatures in degrees Kelvin for several sources.

NBC has spent more than a dozen years developing its present color operating techniques. This past summer, CBS and ABC found themselves cramming for their fall color exam. Local studio colorcasts are now a way of life for quite a few medium-market stations. Here is a review of the basic considerations in adding studio color to any local outlet, based on the experiences of several of these small stations.

Basically, color is a phenomenon which is added to a monochrome base. Thus, color operation will follow many of the patterns of good b-w operation.

Generally, technical fears in anticipation of color have either failed to materialize or were satisfactorily solved before a major share of stations even considered local colorcasting. Most personnel with aptitude for monochrome become proficient in color with little difficulty.

It is true that more light is required; that lighting must be done with more care and will probably take twice as long as you are accustomed to; that camera setup and maintenance will take longer; and that rehearsals will take longer than with black - and - white. However, these things have a way of working into standard practice, and you will probably find after a few hundred hours that rehearsal time will settle back to normal.

People

An important factor in color productions is the staff. Color requires closer coordination of various segments of studio staff than is necessary in black-and-white. A color clash in black-and-white may be unsightly only to those in the studio; but, in a colorcast, a costume that clashes with colors in scenery or lighting can detract as much from a show as well coordinated color and light could add.

Because color is difficult to measure, it is important that people involved in color production are all seeing the same hue. One help is to have personnel who will be involved in color judgement take a Munsell 100 Hue Color Test. This will point out any color-blind designers or video operators, and will test remaining personnel for superior, average, or poor color discrimination.

The set of tests, which also measures zones of color confusion by simple graphic plots, is available from Munsell Color Co., Inc.; 2441 North Calvert Street; Baltimore, Maryland. Cost is about $130.

Once you have a competent and cooperative staff, and of course the (presently scarce) color equipment, you can begin operation. Be sure technicians learn how to set up color cameras, and that they have proper equipment. There are stations that have operated in color without a vectorscope, and there are those who just toss their technicians into the mill and let them learn by experience. Such operations have been generally restricted to stations with a single color-film chain. Camera matching problems are so apparent and so difficult to adjust by eye that such ill-equipped stations

almost invariably have to add needed test equipment and training as they purchase additional color gear.

Electronic Equipment

Starting point for fine color is fine monochrome. After you have the black-and-white up to snuff, with all differential-phase and differential-gain problems ironed out, you can proceed to tune up color gear. Chances are, if you are adding live color, you already have some color-film experience. Technically, the setup procedure for live color parallels that of film color. Minor differences are associated with setting up image orthicons or Plumbicons® as opposed to simple film vidicons. More attention should be lavished on intercamera phasing and gamma matching. Camera mismatch that would be ignored in a two-camera film operation (because of infrequent switching of cameras) becomes painfully apparent on live cameras that are switched several times a minute.

Lights

Out in the studio, good color requires more light, of better quality, than is necessary for monochrome. Color television has brought into technical vogue the term "color temperature," which is simply a measure of the color of a lamp's output (Fig. 1).

So far as the local studio is concerned, actual color temperature is not as important as maintaining an even color temperature after cameras have been set up. A decrease in color temperature will deliver a picture shaded toward red, while a color-temperature increase will cause a bluer picture (referred to a camera setup for white at your studio's reference color temperature). Shifts in color temperature are caused by excess dimming of lamps and by the lamp changing color as it darkens with age.

Lamp dimming—that is, the reduction of filament voltage to reduce light output—can be used with moderation. A dimming of four stops, or about 250° K (Kelvin), can be used before a color change will be apparent to viewers. The simplest means of not exceeding this range is by marking the dimmers or by using series resistors to limit dimmer range. Care must be taken to insure that lamps darkened by age have not put their dimmers beyond the color range. A regular plan of lamp inspection, with removal of any that have begun to darken, should keep you within the 250° K range.

Fig. 2. Color sets require more base and fill light than do black-and-white scenes.

Light levels of 300 to 400 footcandles are necessary to obtain good color pictures for present image-orthicon cameras. This does not necessarily mean that a large number of new fixtures are necessary. First, color generally requires more base and fill light (Fig. 2), and a couple of extra scoops can bring the light levels up considerably. Second, as you begin to accustom crews to limited dimming, you will find the average light per fixture has increased noticeably.

It is best to begin by using your present fixtures efficiently, concentrating them over a smaller area until your color lighting techniques develop enough to indicate which additional lights are needed. Such action could have a side benefit. The fixture and lamp industry is currently struggling internally to standardize fixtures and bulb design for the new quartz lamps. Network studios currently buzz with stories of developmental problems in quartz equipment. The stories are based principally on difficulty in getting a good shadowless scoop light because of the point-source nature of quartz lamps, and on recent moves to develop single-ended quartz lamps that will fit present fixtures.

However, present quartz equipment does have the advantage of even color temperature throughout the life of the lamp. Also, the out-

• Please turn to page 44

This view of a network color studio shows the high level of illumination required.

CARE AND TESTING OF BROADCAST TURNTABLES

by Larry J. Gardner, BE Consulting Author, Chief Engineer, WKIX, Raleigh, N. C.—Your station's reputation is affected by how well you maintain these machines.

At least half the programing of most present-day radio stations originates from records, which of course are played with broadcast turntables. It is on the quality of these units that the overall quality standards of the station are judged by the listener, who is becoming a very critical judge indeed. So, it is in the best interest of a station to keep its turntables in the best possible condition.

Mechanical Considerations

Before any pickup system can reproduce a disc recording properly, the disc must be rotated at a definite and constant speed, and its rotation must be free from as much other mechanical movement as possible. Speed variations cause "wow" when they occur at rates of less than about 10 cps and "flutter" when they occur at higher rates. Mechanical motion other than the rotation of the turntable causes an extraneous signal known as "rumble" to be introduced into the pickup. Rumble is made up predominately of noise below 100 cps.

Wow and flutter are measured best with flutter meters. However, these generally are not available to the broadcast engineer, so he must depend on a qualitative analysis using his ears. For all tests on turntable systems, a good test record (such as the 1965 NAB Test Record) is absolutely necessary. Using a 3,000-cps tone on the test record, listen for changes in the pitch of the tone. On a turntable with low wow and flutter, speed variations will be so slight that the pitch is almost perfectly constant.

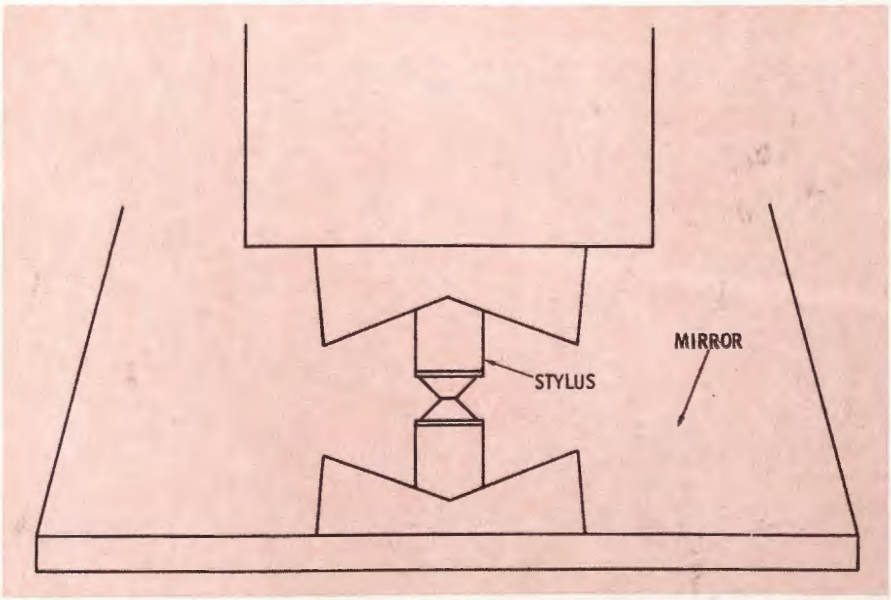


Fig. 1. Stylus and image should form straight line when viewed from any position.

To check the rumble level, play back the standard-level tone (usually 1,000 cps) from the test record, set the console fader to the 12 o'clock position, and adjust the master gain control on the console for a VU meter reading of zero VU, or 100%. Then, without changing the master gain setting, play the silent groove on the test record, turn the turntable fader up all the way, and note the VU-meter reading. Since the 12 o'clock position on practically all faders is 20 db below maximum gain, adding -20 to the VU meter reading will give you the rumble level of the turntable. For example, if the VU meter reads -15db, the rumble level is 35 db below NAB standard level. Any reading greater than 30 is considered acceptable.

What if you have wow and flutter? And rumble? Here's what to do about it. Since practically all turntables in use today are of the rim-drive, or idler-drive, type, the discussion will be confined to this type. First, check the drive idler wheel or wheels. With the motor

running and the turntable removed from its socket bearing, press the drive idler against the motor shaft, holding your finger on the idler shaft. You should feel only a very slight vibration. If you feel a strong vibration, the idler probably has a flat spot on it and should be replaced. Flat spots on the idlers are the most common cause of flutter and a frequent source of rumble. Also, any grease or oil should be removed from the idler, the motor shaft, and the turntable drive surface with denatured alcohol.

The main turntable bearing should be well lubricated according to the manufacturer's instructions. Many turntables use a single large ball bearing in the turntable shaft well, and very frequently this can become lost while the unit is disassembled. Most tables will run without the bearing, but will develop wow, flutter, rumble, or any combination of the three. Be sure the bearing is in place and the shaft well is oiled enough that some pressure is required to reseat the turntable on its bearing.

In adjusting the drive-idler pressure, the best setting is usually that point which provides the fastest starting. This not only provides more positive mechanical action, but also is the best compromise between too little pressure, which causes poor drive, and too much pressure, which causes slow motor speed. Check the speed with a stroboscope disc under a fluorescent or neon light. With most professional turntables, there are two common causes of speed variations: poor adjustment of pressure and a defective motor bearing. A bad motor bearing can also cause flutter and rumble, and the best test of the motor is to listen to the sound it makes when it is running. If there is any hint of a rattle, trouble is on the way. A good lubrication job will often keep a marginal motor running well for quite a while. Also, keep the felt or rubber mat on the top of the turntable in good shape, since it is the final link in the drive chain from the motor to the record.

The Arm and Cartridge

Probably the most neglected part of the turntable is the arm, but it is a major factor in determining the overall operation of the system. It should be properly mounted, according to the manufacturer's instructions, so that there is a small overhang as the stylus is brought as near as possible to the turntable spindle. The arm should be adjusted for correct tracking force for the cartridge in use and should have its pivots adjusted for minimal drag on the stylus. Improper stylus tracking force can cause poor frequency response, poor stereo separation, increased distortion, increased stylus wear, incorrect stereo phasing, and increased record wear. Arm pivots which cause excessive drag can cause all of these effects and unbalance between stereo channels. Follow the instructions, and be sure the arm adjustments are right—they are important. Frequent checks with a stylus-pressure gauge are well worth the time.

Table 1. Frequency Responses of Typical Pickup Cartridge

Frequency	5K load	10K load	50K load
30 cps	+4.0 db	+0.1 db	−4.6 db
50 cps	+2.8 db	0.0 db	−4.2 db
100 cps	+1.9 db	−0.3 db	−3.5 db
400 cps	+0.8 db	−0.5 db	−1.9 db
1 kc	0.0 db	0.0 db	0.0 db
2.5 kc	−0.6 db	+0.2 db	+1.0 db
5 kc	−1.3 db	+0.2 db	+1.8 db
10 kc	−4.4 db	−0.5 db	+3.5 db
15 kc	−6.5 db	−0.5 db	+4.8 db

Almost all cartridges used by broadcasters are in the general "magnetic" category, which includes the variable-reluctance, moving-magnet, and moving-coil types. All three are available in both stereo and monophonic designs. There are only two basic troubles usually experienced with cartridges: stylus trouble and mounting trouble. About the only cure for a worn, broken, bent, chipped, or mutilated stylus is replacement. For mounting, there are several things to keep in mind. First, the cartridge must be mounted correctly in the arm. Second, it must meet the surface of the record at the correct angle.

The stylus angle is very important, especially for stereo work. It may best be checked by placing a small pocket mirror on the turntable, resting the stylus on the mirror, and adjusting the stylus postiion until the reflection is perpendicular to the stylus in all directions (Fig. 1). (Note: Some of the newer stereo cartridges operate with the stylus at a 15° angle from the vertical in the direction of groove motion. Fig. 2 shows how the angle should look on this type of cartridge. The angle is not extremely critical, but should not be more than 15°.)

The Electronics

There are two common ways of connecting a pickup cartridge into a broadcast console. Most popular

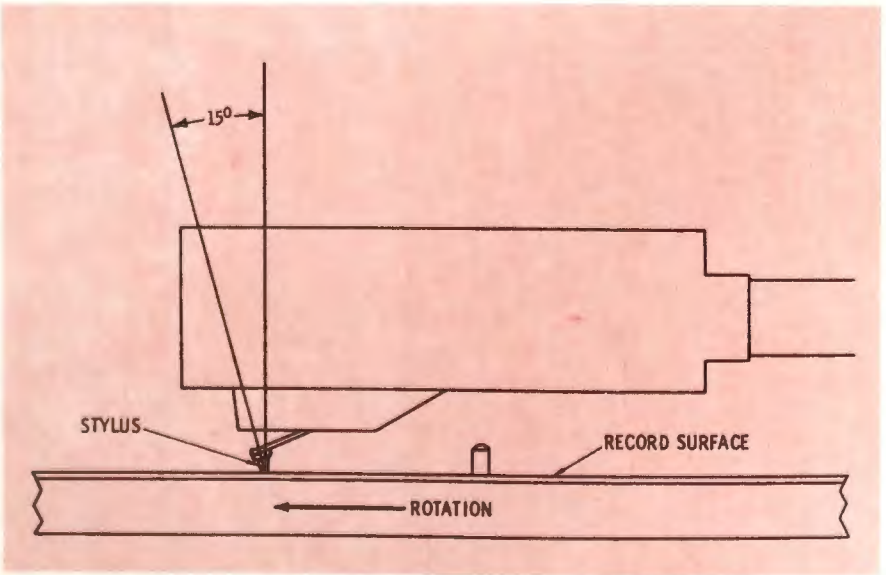


Fig. 2. Side view shows proper mounting position for a cartridge with 15° stylus.

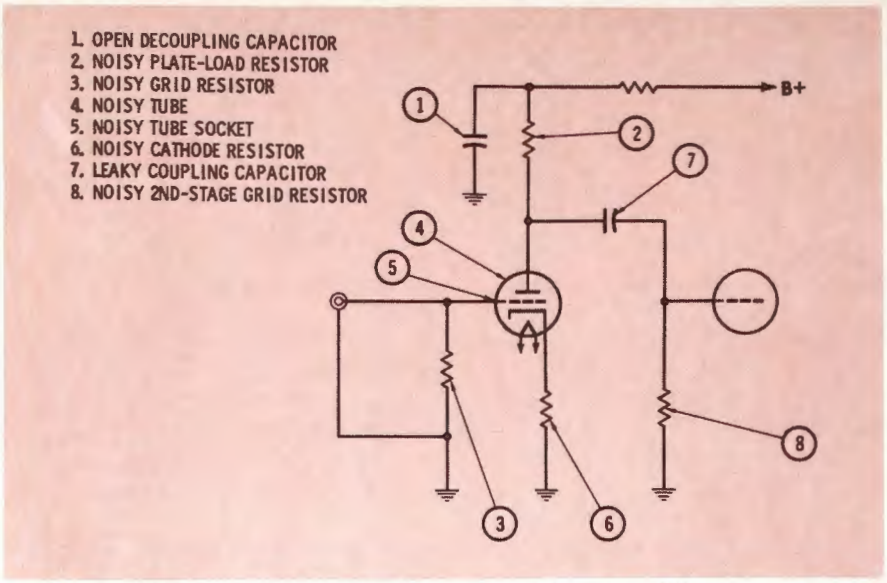


Fig. 3. Potential sources of noise in a vacuum-tube preamplifier input stage.

is the use of an equalized turntable preamplifier which delivers sufficient output to drive a high-level console input. Another method is to use a passive equalizer feeding a flat-response microphone preamp. Either method is satisfactory, although the equalized preamp offers the advantage of somewhat lower noise level. In either system, the most common problem is failure to achieve flat frequency response. Equalized preamps and passive equalizers are designed to operate with particular cartridges, which may or may not be electrically the same as the ones with which they are used. Also, cartridges of the same make and type often show individual variations in frequency response. In most cases, the response may be made correct by varying the load resistance into which the cartridge works. As a general rule, increasing the load resistance increases the response at the high end (5,000 to 15,000 cps) and decreases the response at the low end (below about 200 cps). Decreasing the load resistance has the opposite effect. Table 1 shows the response of a typical cartridge with different values of load resistance. Since the magnetic cartridge is essentially a low-impedance device, changing the load resistance over a rather wide range has little effect on the output level. To determine the correct load, connect a 50K carbon potentiometer across the cartridge, and adjust for response that is the same at 1000, 100, and 10,000 cps; then measure the resistance of the control as set for the best possible response, and substitute a fixed resistor for it. With some cartridge-preamp or cartridge-equalizer combinations, it may be necessary to change the value of the load resistor within the preamp or equalizer.

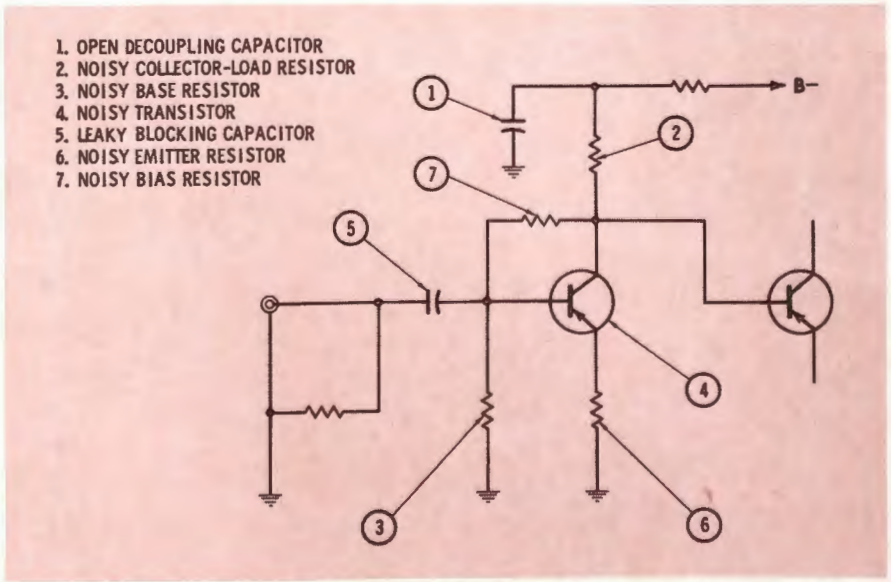


Fig. 4. Possible noise sources in input stage of a transistor turntable preamplifier.

Another common problem with turntable electronics is hum and noise. To track down a hum problem, first disconnect the pickup from the preamp. If the hum disappears or drops greatly, chances are the problem is a ground loop. Ground loops are caused by the presence of more than one return path from the cartridge to the main chassis ground in the preamp. This problem is more critical with stereo than with mono, but it can be avoided simply by avoiding multiple ground paths. With a monophonic system, the cartridge cable shield should be grounded only at the input of the preamp or equalizer. For stereo, the two channels should be kept completely separate from the cartridge to the preamp or equalizer input. Also, it is important that the turntable motor and base be grounded directly with a single wire to the preamp chassis, or, if an equalizer is used, to the main station ground. Of course, the preamp chassis should also be connected to the station ground.

Noise occurring in the preamp may be either hum or "white" noise. Hum may generally be cured by shielding, selecting tubes for lowest hum level, carefully adjusting "hum-balance" controls, and checking for low-value filter capacitors. White noise, or "hiss," may be due to any of the parts indicated in Fig. 3 and Fig. 4. If the noise originates ahead of the equalizer circuits, it will take on a characteristic "roaring" sound due to the high-frequency rolloff of the equalizer. In this case, the noise is generally due to a defective tube, transistor, resistor, or capacitor in the input stage, although a noisy socket or poor connection can produce the same symptoms.

The ideas outlined here should be of help in getting and keeping turntables in shape to deliver a consistently high-quality signal. ▲

HIGHLIGHTS OF THE NAEB CONVENTION

by **George C. Sitts,** Eastern Regional Editor

The National Association of Educational Broadcasters Convention (held last November 1-3) resembled in many ways the NAB Convention held seven months earlier at the same location—the Sheraton Park Hotel, Washington, D. C. Station managers and engineers engaged in discussions with equipment-sales representatives and strolled through a hall full of equipment displays. Sessions, seminars, and panels were conducted on every subject from curriculum planning to color conversion—with the notable exception of a previous favorite, "Is ETV effective?" Apparently, educators had accepted the effectiveness of ETV as a foregone conclusion and thus used their convention time for learning new ways to improve the use of the medium.

The day the educational broadcaster borrowed equipment from a local commercial station, operated a shoestring station, and divided his time between pleading for funds and keeping ancient equipment on the air appears over. This year, the talk was of replacing old equipment, finding capable engineers and production people, and improving curriculum, teaching methods, and effectiveness.

Equipment manufacturers were among the first to recognize this trend to increased professionalism. The educational broadcasters were treated to large equipment exhibits, working displays, and round-the-clock hospitality suites. Equipment representatives were generally well acquainted with dispersion of new NDEA and Poverty Program funds, whereas many educators appeared uncertain of which moneys were available to them. Sessions pertaining to financial aid were SRO.

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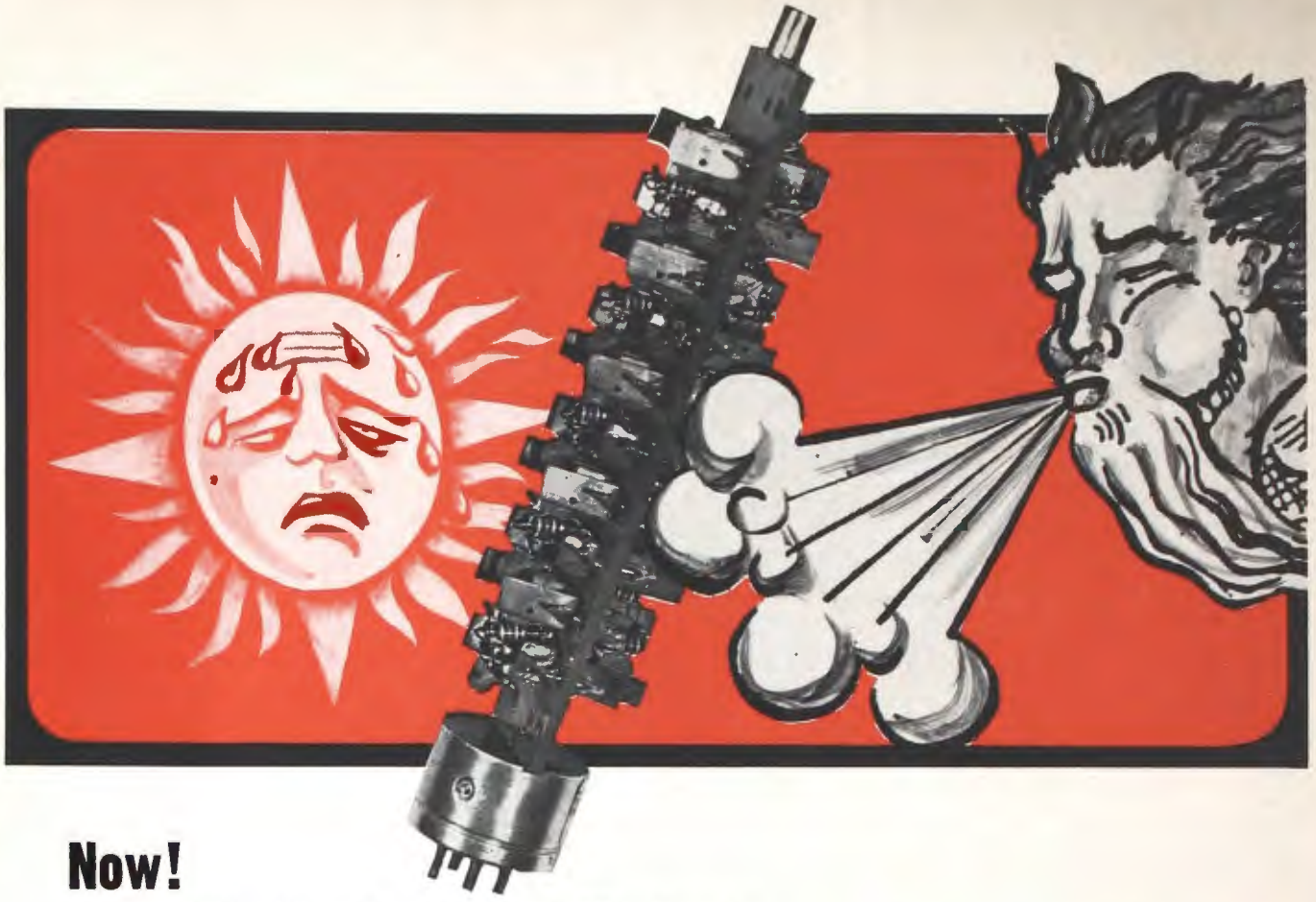

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SR-14-12	872	8008	575	14KV	12	84.00
SR-20-6	6894	6895	673	20KV	6	100.00
SR-20-12	6894	6895	673	20KV	12	120.00
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Circle Item 13 on Tech Data Card

January 1966

We interrupt this magazine to bring you...

Late Bulletin from Washington

by Howard T. Head

AM Licensees Have Resiting Problems

Standard broadcast licensees are finding it increasingly difficult to provide coverage of the nation's growing towns and cities. Not only does this growth create problems of covering areas largely vacant when the transmitting facilities were constructed, but populous subdivisions are often built in areas where directional antennas are required to produce deep nulls. This results in poor coverage of the affected areas, as well as distortion of directional radiation patterns beyond acceptable limits.

Transmitter relocation is sometimes resorted to, but these plans may be complicated by increases in real-estate values. Sites low in price a few years ago may now be highly valued, while increases in real-estate values and the additional difficulty of providing adequate signal to the city make selection of new locations difficult.

The Commission is aware of the problem, but existing Technical Standards governing coverage of the city, blanketing, and maintenance of directional antenna patterns are still rigidly enforced. Recognition has recently been given, however, to problems created in some instances by minor interference changes when transmitters must be relocated over short distances. Generally, however, the problem is becoming more acute, and little relief is in sight.

Land-Mobile Base Transmissions by FM Multiplex

A Working Group of the Commission's Advisory Committee on the Land-Mobile Radio Services has proposed a novel means for accommodating a substantial number of transmissions for base stations in the land-mobile radio service. These services, which include police, business, industrial, and many other services, have complained of an increasing shortage of spectrum space for both base and mobile operation. Under the new proposal, land-mobile base transmissions would be provided by multiplexing subcarriers on FM broadcast stations. In successful tests at WRYT (FM), Pittsburgh, Pennsylvania, as many as eight narrow-band subcarriers were multiplexed on the WRYT carrier without experiencing mutual interference, or without causing interference to the main transmissions of WRYT.

Under typical circumstances, these land-mobile base transmissions can be received out to distances on the order of 15 miles. Transmissions from

the mobile unit to the base-station receiver would be accomplished over the regular land-mobile channels. One drawback of the proposal is that stereo FM transmissions must be curtailed; also, regular SCA operations would conflict with the land-mobile transmissions.

Transmitters Must Be Visible From Operating Position

The Commission has called attention to the fact that transmitters not operated under a remote-control authorization must be visible from the operator's position at all times. The visibility may be provided by means of a suitable mirror, or in some instances closed-circuit television systems have been accepted as providing the required visibility. In these instances, however, the Commission has required that the transmitter be reasonably accessible to the operator.

In those instances where the visibility requirement cannot be met, the Commission requires a formal application for remote-control operation (FCC Form 301-A) with all control and metering circuits specified by the remote-control Rules.

More Action on Clear Channels Due Soon

The Commission has once again turned its attention to the problem of the most effective use of the 24 clear channels heretofore reserved for the exclusive use of one 50-kw Class I-A station during nighttime hours. On twelve of these channels, provision has already been made for a single Class II-A full-time station in one of the Western stages; in most instances, these Class II-A stations have either been granted, or conflicting applications have been designated for hearing.

The Commission is now preparing to establish guide lines for the further use of the clear channels. These include: (1) conditions under which clear-channel operation may be permitted with powers up to 750 kw, (2) conditions under which additional unlimited-time Class II stations may be permitted on the clear channels, and (3) the assignment of daytime-only Class II stations to the clear channels.

Short Circuits

New filing fees required for broadcast applications have been established (May 1965 Bulletin), effective January 3, 1966 . . . ZIP-code your return address in writing Federal Agencies; they are required to ZIP-code their replies . . . A Citizens band licensee in the Boston area has been sentenced to a year in prison for transmitting "obscene, indecent, and profane" language over his CB station . . . New Rules governing presunrise operation of daytime-only AM stations are expected soon . . . Most broadcast interests have opposed the Commission's proposal to establish "antenna-farm areas" for tall FM and television towers, largely on the grounds that the proposals give the FAA far too much authority over the height and location of tall broadcast towers . . . NASA has issued invitations to contractors for feasibility studies of direct satellite-to-home broadcasting in the short-wave and FM bands; television wasn't mentioned, but is known to be under study -- the enormous amounts of power required and channel availability appear to present the most serious problems in television space broadcasting.

Howard T. Head...in Washington

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Circle Item 14 on Tech Data Card

NAEB Convention

(Continued from page 23)

For engineers fortunate enough to attend this convention, there was in addition to the exhibit hall a full-day engineering program, hosted by Jansky & Bailey, on Tuesday. The day began at 8 AM with a continental breakfast where engineers had a chance to get acquainted with each other. A few equipment reps and some federal personnel also attended. Thus the group conversations ranged from quality of various pickup tubes to FCC computer errors in channel allocations to an NDEA man's attempt to explain who gets money for equipment, why, and how much.

After Oscar Reed, Jr., chairman, started the program promptly at nine, William J. Kessler, consulting engineer and professor of engineering at the University of Florida, discussed engineering problems and developments resulting from establishing ETV in American Samoa. The talk was especially informative to those interested in engineering theory.

For engineers concerned with the nuts-and-bolts, day-to-day operation of ETV facilities, there were several effective speakers, among them William C. Lewis. The technical services director of the Delaware statewide ETV system presented an informative and well illustrated talk on the role hard-nosed business practices, ingenuity, and manual labor played in meeting a tough deadline for completion of that state's system.

Roger Penn, assistant professor at American University, reported on his research to determine viewer rating of relative picture quality of four common live-camera pickup tubes. Pictures from an average 3" I.O., 4½" I.O., Plumbicon®, and vidicon were evaluated by a group of viewers for such qualities as smear, resolution, and gamma.

Allen B. MacIntyre, director of engineering at the University of North Carolina, probed the planning and actual field problems of building the 500-mile North Carolina ETV microwave system.

In a paper presented by his engineering staff, Charles A. Prohaska, assistant general manager of WETA, Washington, D. C., discussed the design, building, and operating success of the station's one-vehicle remote van.

Later, an Engineers' Professional Interest Section of the NAEB was formally organized, with Ronald Stewart, consulting engineer for the Kentucky Educational Television Authority, elected chairman of the group. The Interest Section will represent member engineers within the NAEB and will aid in organizing regional meetings of its members.

With all the discussion today about commercial color television, the subject was inevitable for the educational broadcaster. E. C. Tracy, division vice-president of RCA, spoke Monday on the various costs of color conversion.

As with the NAB, some exhibits were crowded, others not. Among the items that drew the crowds were:

Ampex's VR-7000, a new VTR in the $3000 range.

RCA's PK-330, an $8500 vidicon studio camera chain with a zoom lens, yoke, and vidicon assembly that tilts while the viewfinder remains level.

Sony targets the sound you want

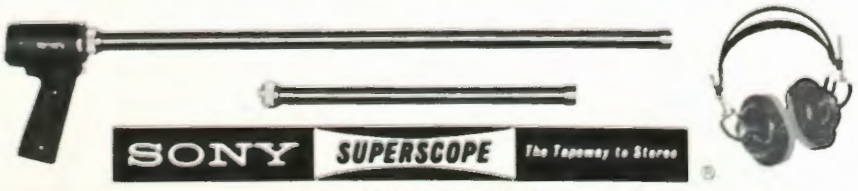
Telemike Exclusive: Built-in Monitor Facility*

Now, with *three* readily interchangeable sound tele-probes, similar in principle to changeable telephoto lenses, you can 'zoom' in from varying distances for the precise sound you're after. The 18-inch probe may be used for 'close-ups,' as far back as 75 feet from the sound source; the 34-inch probe from 150 feet. A 7-foot probe is optional for distances beyond 150 feet.

*The most unique feature, a Sony exclusive, is the built-in, battery powered, solid state monitoring amplifier in the pistol grip handle, which assures the operator that he is transmitting the source with pin-point accuracy.

OTHER FEATURES, OTHER USES: The new Sony F-75 Dynamic Tele-Microphone is highly directional at the point of probe, with exceptional rejection of side and back noises (35 to 40 db sensitivity differential). Recessed switching allows quick selection of impedances (150, 250 and 10K). The uniform frequency response, controlled polar pattern, and unprecedented rejection of background noise eliminates feedback interference in P. A. systems.

The complete Sony F-75 Tele-Microphone includes two sound probes, 18 and 34 inch lengths, monitoring pistol grip handle and the Sony dynamic headset, all in a velvet lined compartmentalized carrying case, for *less than* **$395.** For specifications and a catalog of the complete line of Sony microphones, visit your nearest Sony/Superscope franchised dealer, or write: Superscope, Inc. Dept. 52, Sun Valley, Calif. *The best sound is Sony.*



SONY SUPERSCOPE The Tapeway to Stereo

Circle Item 17 on Tech Data Card

Color-Tran's 1000-watt focusable quartz flood—a 9″ x 9″ package priced at about $80.

Sarkes Tarzian's 2700L Plumbicon® studio camera chain — about $13,000.

Sylvania's mobile TV production unit—a self-contained van including two vidicon camera chains, assorted monitors, switchers, audio mixer, input-voltage regulator, gasoline-powered generator, steel-plated roof with camera turret—$42,500.

GE's PF-11-C pneumatic multiplexer utilizing, as the name implies, compressed air to operate the mirrors—about $4000.

Visual Electronics' PM-50 Plumbicon® studio camera featuring a built-in ten-to-one zoom lens—price near $20,000.

Throughout the show, a number of station managers attempted to fill new, high-paying engineering positions. We asked about the positions and got these replies:

"Our present engineer (in the $5000-6000 bracket) is good on old-equipment repair, but we're to the point where we need someone who can select new equipment and who can take command of our growing technical staff."

"There is too much responsibility on the engineer's shoulders for us to trust our new equipment to an inexperienced engineer."

"We have low-paying engineering jobs too, but the man that's hard to get is the responsible engineering administrator."

"Because our reputation for quality and continuity rests on one engineer, we'll pay extra for a good man."

Thus, the 1965 NAEB Convention pointed up the need for professional, well-informed ETV engineers. By 1966 show time, many of these positions will be filled, and these people will be concentrating on bringing the ETV industry technical professionalism. It should be a very interesting year. ▲

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LE indicates "Letters to the Editor"; **NI** indicates "News of the Industry."

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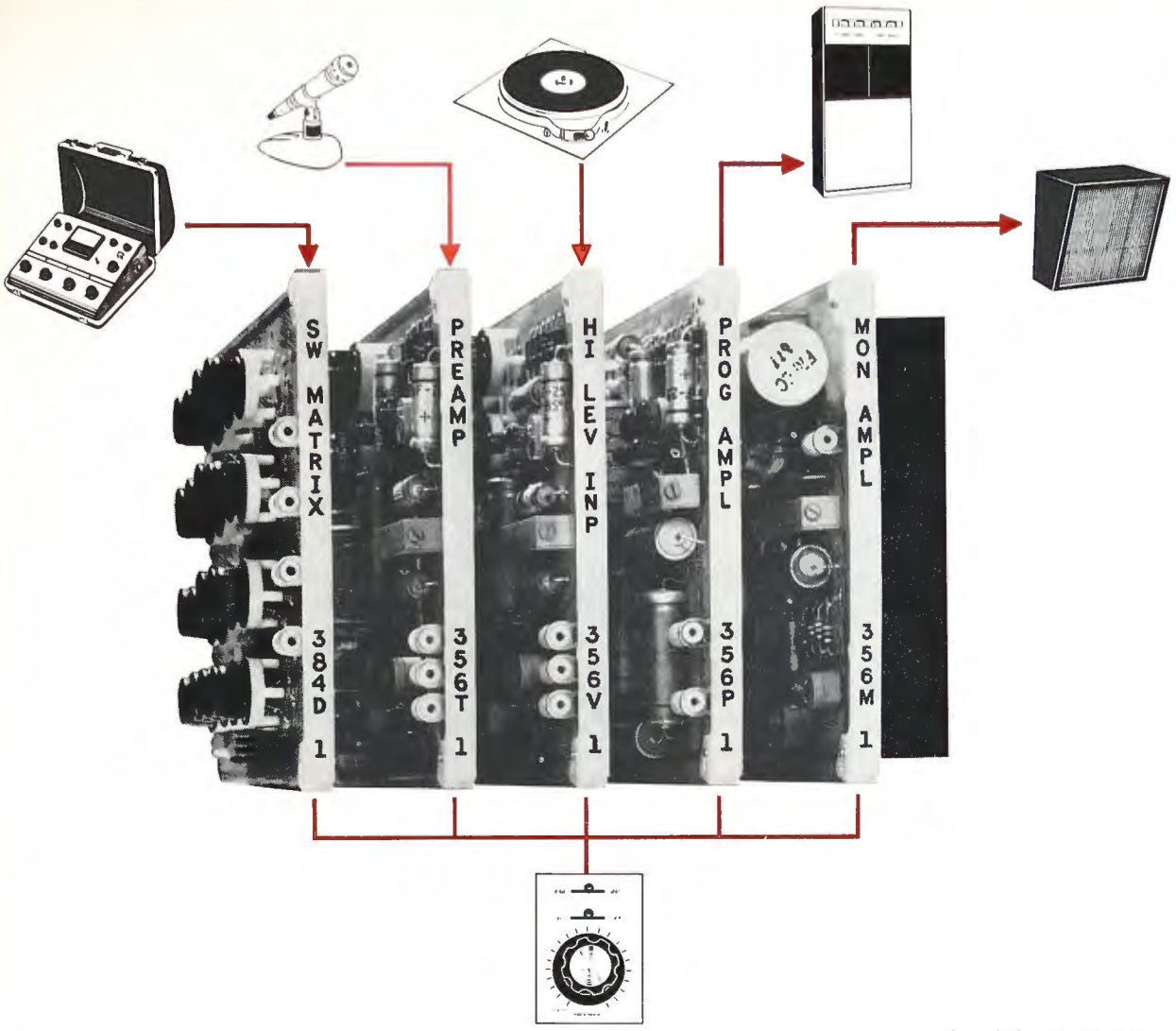


Actual size of card 6⅜" x 4½"

Now, Collins photoconductive controls can be custom designed for your studio!

Eliminate pops, clicks and hums by replacing mechanical contacts with Collins' new photoconductive modules.

Arrange cards (solid state modules with integral switching) in any configuration you want.

Concentrate all your sensitive wiring within card cage, away from all interference.

Remote your amplifiers with a simple 4-volt, dc wire (instead of shielded cable).

Eliminate your biggest maintenance problem: worn or dirty mechanical contacts. With photoconductive cells instead of relays and switches, you won't have a mechanical contact in your program circuits.

Simplify troubleshooting. Replace attenuator, input switches, and amplifier output switches with one quick shuffle of cards.

For the finest audio available, let Collins' specialists custom design your studio. Contact your Collins Sales Representative, or send a block diagram of your requirements to Collins Radio Company, Broadcast Communication Division, Dallas, Texas 75207.

COLLINS

COMMUNICATION / COMPUTATION / CONTROL • COLLINS RADIO COMPANY / WORLD HEADQUARTERS / DALLAS, TEXAS

Circle Item 20 on Tech Data Card

Local Color

(Continued from page 19)

put per watt of power is slightly higher than with conventional incandescent lamps.

Whatever lights you choose, color requires careful lighting, and careful lighting demands control of light direction and intensity. Aside from the mentioned four-stop range of dimming, you'll need to use scrims, screens, fixture movement, and spotting down or flooding out of fresnels to get satisfactory color pictures. Aluminum screen (not copper, which shades the light toward the red) can be used to reduce light output, with each layer of screen reducing output about 15%. New lighting-grid designs allow easy repositioning of fixtures. Whatever you use, the care the lighting men take is far more important than the fixtures themselves.

Base light tends to be higher in color temperature. This is due in part to attempts to reduce contrast range to a practical figure. A reasonable contrast range is twenty to one, though thirty to one is still okay. In a local studio, it is often difficult to measure contrast range, but excess contrast can be identified by shadows that are dark and heavy and appear multicolored on the screen. A general rule is not to raise contrast above the level where detail becomes invisible in dark shadow areas.

Conclusion

Because this article is for engineers, many of the problems of scene designers, costume designers, and makeup men aren't mentioned. However, these people must be allowed ample opportunity to view their work on both color and monochrome monitors until they become confident of their new skills. Color is a naturally expressive medium—a medium that is pleasant to work in once the fundamentals become second nature. ▲

ENGINEER'S EXCHANGE

Quick Transmitter Neutralizing

By Walter L. Johnson, Jr.,
Chief Engineer,
WELS, Kinston, and WGOL,
Goldsboro, North Carolina

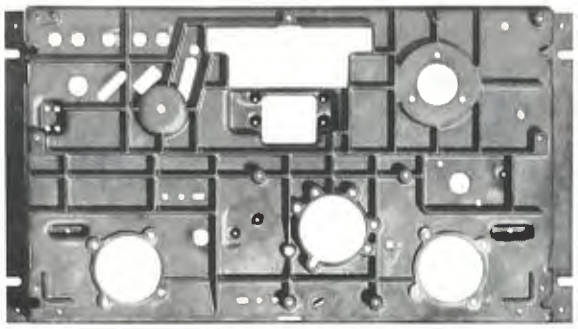
Quite often engineers get together and discuss how they do things and the problems encountered in doing certain of those things.

One of the most frequent complaints concerns the neutralizing of transmitters with the old "coil of wire and a bulb" method. The most frequent problems have been: 1. finding a place on the coil "hot enough" to make the bulb glow, and 2. the fact that in most cases, after the bulb goes out, there is a lot of turning of the neutralizing adjustment left to do in order to find the exact null.

For the past year or so, we have tried neutralizing transmitters with a VOM and have had very good results. Not only is it possible to get enough "juice" to obtain a reading, but the null can be pinpointed exactly and easily.

The method is very simple: 1. Disconnect the high voltage going to the final tubes as usual in the neutralizing process. 2. Connect one lead of your VOM to the ground or shield of the RF coax at the transmitter and the other lead to the transmitter "hot" antenna terminal. 3. Set the VOM to "AC volts" and at the highest possible scale. 4. Turn on the transmitter (high voltage to finals disconnected). 5. Turn the voltage switch of the VOM down the scale until you get a good reading. 6. Turn the neutralizing adjustment for minimum meter reading. 7. Go down the voltage scale on the VOM, adjusting the neutralizing control as you go until you get the lowest RF reading at the lowest possible voltage scale. Sometimes you may not be able to go to the lowest voltage scale on the meter; it depends on the transmitter, meter sensitivity, voltage scale, and other factors.

• Please turn to page 48



DIE-CASTING

[RHYMES WITH LASTING]

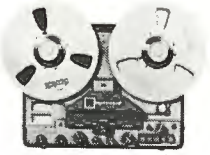
■ Quality in a professional tape recorder has got to last. That's why a sturdy, solid die-cast main plate backs up famous Magnecord durability.

Only a solid die-casting can provide rigid support and stable alignment of assembled parts. Mounting holes and bases are molded in for perfect uniformity between each instrument, insuring precise location and smooth operation. This extra strength in a Magnecord reduces wear to a minimum, cuts down-time and lowers maintenance cost.

Casting about for a professional tape instrument that is broadcast-ready and stays that way? Write for our new brochure featuring the complete line of Magnecord recorder/reproducers.

Model 1021 $708

Model 1022 $788



Model 1028 $995

Model 1048 $995

Magnecord SALES DEPARTMENT
MIDWESTERN INSTRUMENTS, INC.
Subsidiary of Telex Corporation / P. O. Box 1526 / Tulsa, Oklahoma 74105

Circle Item 23 on Tech Data Card

Letters

(Continued from page 6)

transmitter and observed after the VSBF. The ringing and overshoot at the pulse edges are observed on a scope. The phase equalizers may be adjusted to reduce these effects as much as possible. The equalizer settings rarely need to be changed.

DEAR EDITOR:

My article, "Cartridge Recorder Playback with Automatic Cuing," (July 1965 BE, page 22) contained some diagramatic errors which have been called to my attention by several readers.

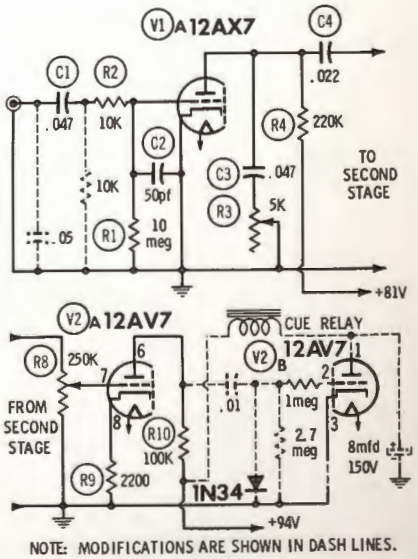
The Viking PB60 Preamp used for cue purposes was modified as follows: 1. The input has a .05-mfd 150-volt capacitor across it to bypass bias voltage which causes false cues. 2. A 10K ½-watt resistor loads the input to ground between C1 and R2. 3. The V2B plate, pin 1, derives B+ through the cue-relay coil, and has an 8-mfd, 150-volt capacitor to ground. 4. The cathode of V2B, pin 3, is grounded. 5. The grid of V2B, pin 2, is connected to the plate of V2A, pin 6, through a .01-mfd 600-volt capacitor in series with a 1-meg resistor. The point between the capacitor and grid resistor is grounded through a 2.7-meg load resistor and the 1N34.

In operation, the bias-free signal is amplified and then coupled to V2B through the .01-mfd capacitor. The signal is rectified, however, before it reaches the grid of V2B, and so develops current across the tube. The change is smoothed by the 8-mfd, 150-volt capacitor and causes the coil to operate the cue relay.

In the original article, I neglected to note the insertion of the bias bypass capacitor, and the schematic was somewhat confused.

JOSEPH D. COONS
President & General Manager,
WOHI AM-FM,
East Liverpool, Ohio

Author Coons also supplied a schematic diagram showing the modifications. The input and output stages are reproduced below.—Ed. ▲



NOTE: MODIFICATIONS ARE SHOWN IN DASH LINES.

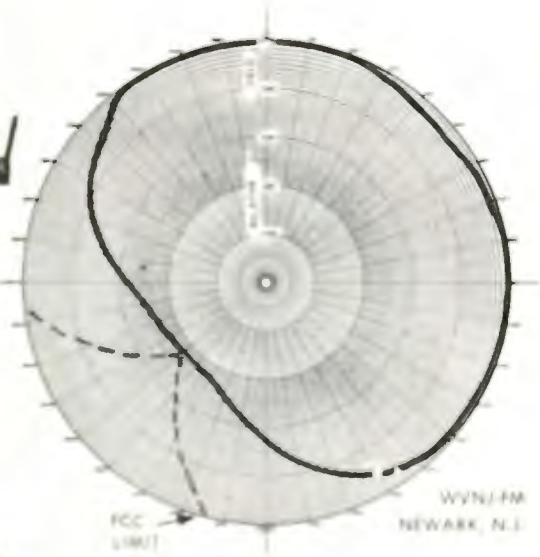
JAMPRO

Directionalized Dual Polarized FM Antennas are PATTERN TESTED prior to shipment

The new Jampro testing range allows our design engineers to erect, test and adjust every antenna to conform to your specific vertical and horizontal pattern requirements before shipment is made.

Since the mounting pole and tower affect the radiated pattern, our engineers can actually duplicate your mounting specifications when adjusting your new directional antenna. We'll even adjust for phasing and spacing of the dual bays, which is often required in tight or multiple null patterns.

Contact Jampro for newly developed technical information regarding Dual Polarized FM Directional Antenna measurements and performance.



ADVANTAGES OF JAMPRO'S NEW DIRECTIONALIZED DUAL POLARIZED FM ANTENNA

Effective radiated power can be increased and still protect neighboring short spaced stations. The 4 DB Bandwidth is not affected and the antenna peak gain is nearly always increased.

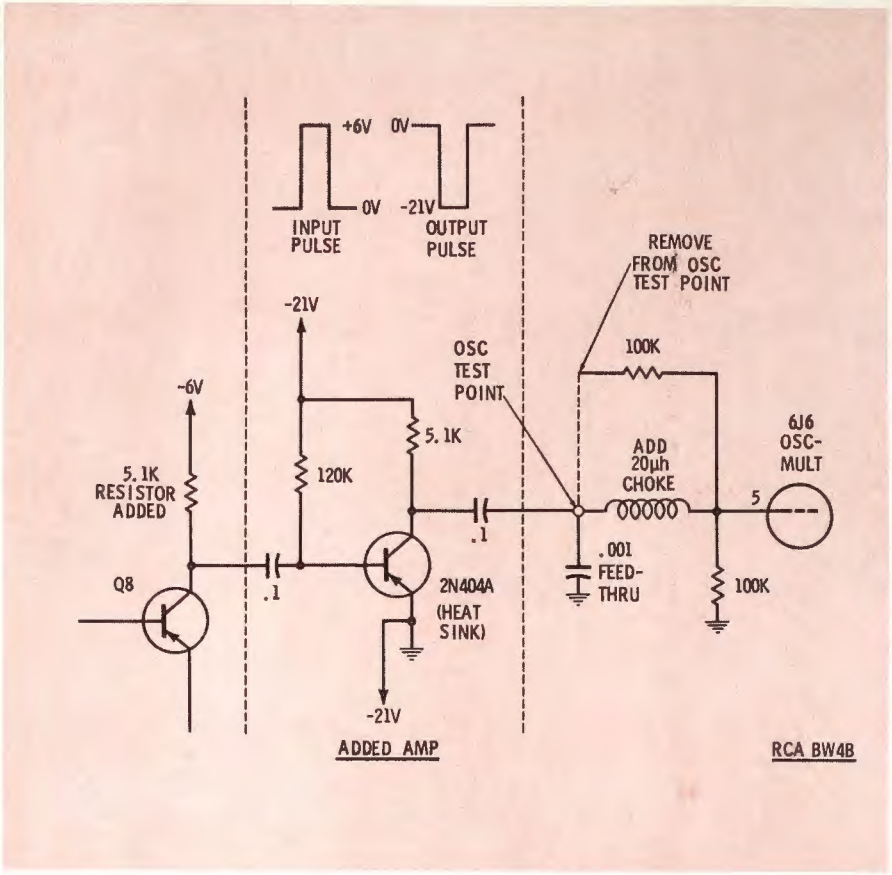
JAMPRO ANTENNA COMPANY

6939 POWER INN ROAD SACRAMENTO, CALIFORNIA

PHONE: AREA CODE 916 442-1177

Circle Item 35 on Tech Data Card

(Continued from page 44)



We have used this method often for over a year, and it has worked perfectly for us. It is certainly a time-saver and is the most accurate "quick" method we have tried.

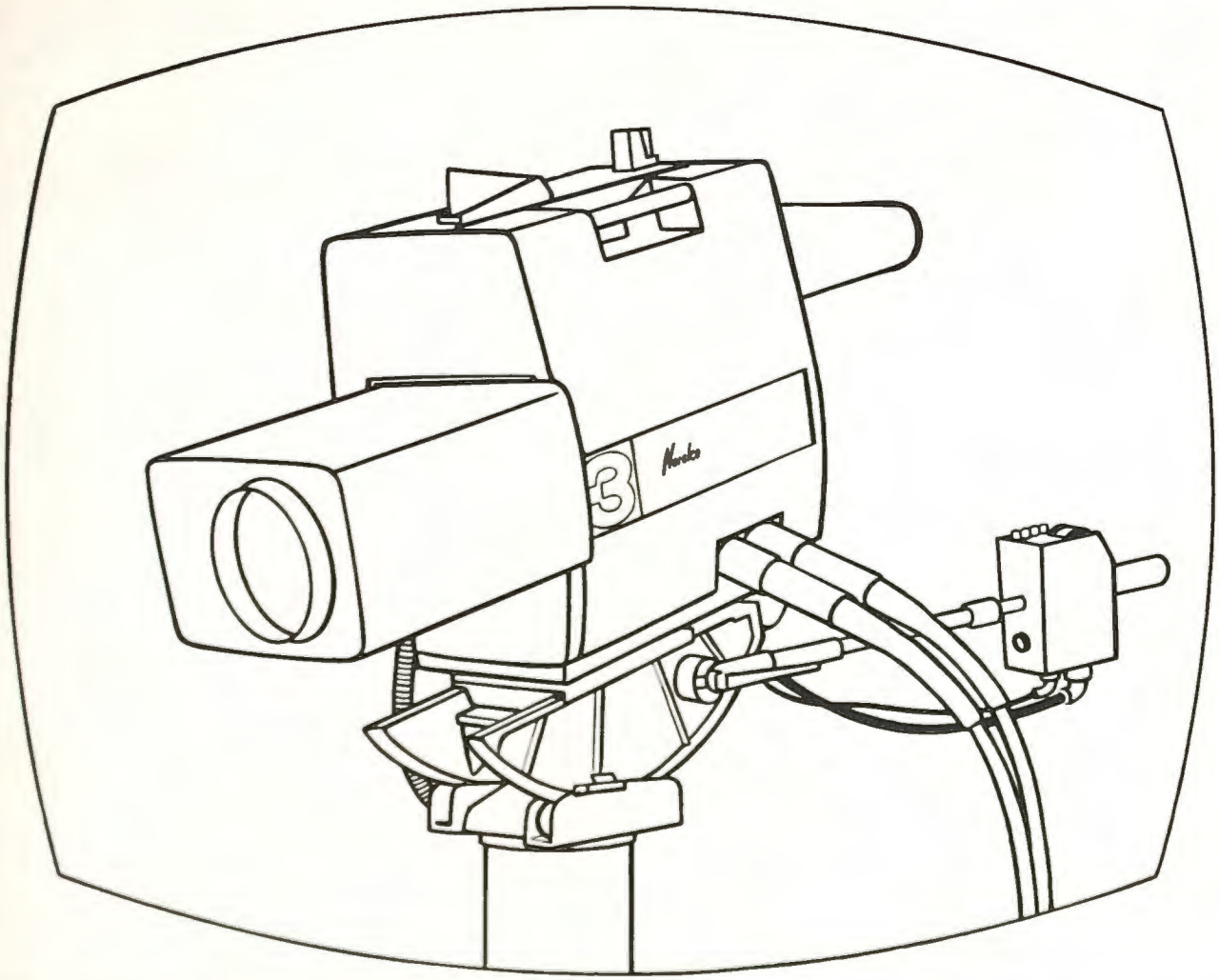
Mr. Johnson is the first winner in our Engineers' Exchange contest. He will receive a volume of his choice from the Howard W. Sams Modern Communications Course **or** Broadcast Engineering Notebooks **series. We'll award a similar prize for the item judged best each month. Why not submit yours?**

Chopper Modification

by Roger L. Peters,
Engineering Maint.,
KMTV, Omaha

This amplifier (at left) was added to the solid-state chopper (July 1964 BROADCAST ENGINEERING) so the unit, which was designed for use with a diode, can be used with an RCA BW4B demodulator or a similar unit. The —21-volt pulse turns off the 6J6 grid, giving a no-carrier zero reference. ▲

COLOR IT FAITHFUL



The revolutionary Plumbicon television camera tube was designed after years of development work supported by original research on "spectroscopically pure" lead compounds at Philips Research Laboratories division of North American Philips Company in Briarcliff, New York.

Color cameras utilizing these amazing tubes are now in production and are manufactured at the Studio Equipment operation in Mount Vernon, New York. Many of these cameras now have more on-air time than any other *modern* color camera in network operational use. The results of this breakthrough have been quoted as the most spectacular improvement in home color television reception—a significant stimulus to viewer, set maker and advertiser alike.

Out of this research and development depth, constant improvements are being made. Color fidelity has now been greatly improved over the amazing results thousands have already witnessed.

With the magic of these new cameras, you too can *Color it Faithful!*

Norelco Plumbicon Cameras are manufactured in Mt. Vernon, N.Y.

Norelco STUDIO EQUIPMENT

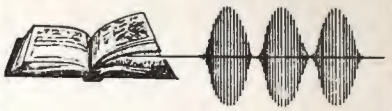
NORTH AMERICAN PHILIPS COMPANY, INC.
900 South Columbus Avenue, Mount Vernon, New York 10550

Plumbicon is a registered trademark

Represented nationally by Visual Electronics Corporation, 356 West 40th Street, New York, N. Y. 10018

Circle Item 27 on Tech Data Card

BOOK REVIEW

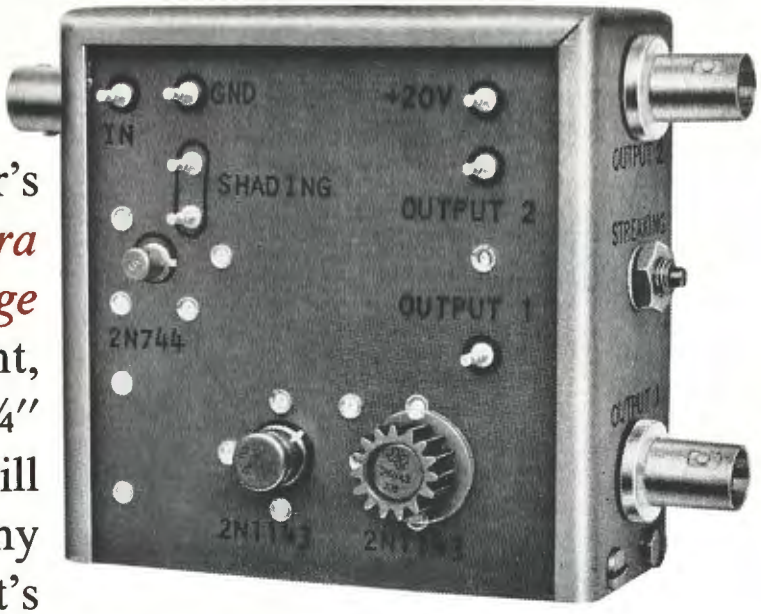


Lightning Protection Code 1965 (NFBA No. 78); National Fire Protection Association, Boston, Mass.; 59 pages, 5" x 7⅝", paperback, 75¢.

This is the latest revision of a code first adopted in 1904. It was prepared by the NFPA Committee on Lightning Protection; the 1965 edition was adopted by the NFPA at its annual meeting last year.

The text of the code is broken down into three major sections: Protection of Persons, Protection of Buildings and Miscellaneous Property, and Protection of Structures Containing Flammable Liquids and Gases. The first section describes what persons should and should not do during a thunderstorm. Basically, it consists of a listing of locations that are dangerous and those that are relatively safe. The second section, consisting of 43 pages, describes methods for affording lightning protection to everything from large buildings to farm animals. The section begins with discussions of factors to consider when planning a structure and factors influencing the decision concerning whether to protect a structure or not. The installation of lightning rods and conductors is covered, and grounding practices are listed. Protective measures for aircraft (while on the ground) and boats are included. The final 10 pages of the code detail methods appropriate for the protection of structures in which flammable gases and liquids are contained.

In addition to enumerating the provisions of the Code, this publication contains a considerable amount of explanatory material. A reading of these sections should impart an understanding of the nature of lightning discharges and can help to clear up any misconceptions the reader may have concerning this subject. ▲



International Nuclear's *transistorized TCA3 camera amplifier fits any image orthicon camera.* That's right, this miniaturized (3¼″ x 3¼″ x 1¼″) camera amplifier will replace vacuum tubes in any image orthicon camera. It's completely transistorized and is very simply mounted within the camera. Microphonics are eliminated. Operating voltage is obtained from 285 volt source already in camera and is post-regulated. *The TCA3 fits any image orthicon camera.* A transistor protective device is included in case the high-voltage blocking capacitor at the image orthicon anode should short-circuit. Signal connectors are BNC type as well as solder-terminals. TCA3 circuit uses but three transistors, all proven EIA types. Output stage delivers signals for view-finder as well as camera chain. Peaking and streaking controls are included and are easily adjusted by use of standard RETMA resolution chart. *We promise, the TCA3 camera amplifier will fit any image orthicon camera.* They are on-the-air proven in TK10/TK30, TK11/TK31, 4PC4A1 and TA124E cameras. Instructions, necessary hardware and pre-cut cables are included.

PRICE, F.O.B. NASHVILLE . . . . . $295.00 EACH

For more complete information write or phone:

INTERNATIONAL NUCLEAR CORPORATION

608 NORRIS AVENUE • NASHVILLE, TENN. • PHONE 615-254-3366

Circle Item 29 on Tech Data Card

NEWS OF THE INDUSTRY

NATIONAL

Grant for ETV Station

A Federal grant of $296,220 has been made to the **South Carolina Educational Television Commission** to activate a noncommercial educational television station on channel 35 in Columbia. Funds will be used to purchase an antenna, tower, transmitter, and other equipment. The total cost of the project is estimated at $592,441.

The station plans 30 hours a week of programs for classroom use, and another 30 hours for teacher instruction, public affairs, and cultural programs. It will become the principal link in the developing South Carolina educational television network because of its proximity to the production facilities and video tape library at the Columbia ETV Center. Other stations in the network are at Charleston and Greenville.

The new station will serve a population of 646,000 persons, including 208,000 students in 400 schools.

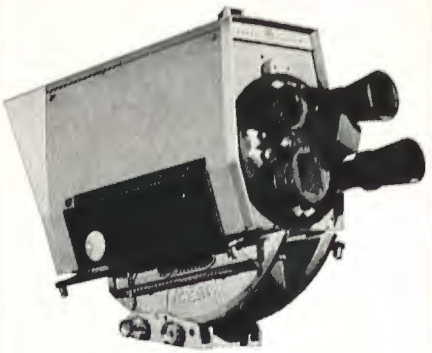
Tall Tower in Texas

A new tower built for Fort Worth-Dallas television station KTVT is 1553′ high compared with 1472′ for the Empire State Building. The tower was fabricated by **Kline Iron & Steel Co.** in Columbia, S. C., and then hot-dip galvanized en route to the erection site in Dallas County. By having the steel galvanized in transit, the station saved itself the cost of shipping the required 22 tons of zinc from South Carolina to Texas. Designed to increase KTVT's coverage area by 55%, the tower took six weeks to erect. The top section was set in place by helicopter. Main supporting members of the 310-ton tower are of 6″ high-tensile steel rod. Holding the unit are 21 steel guy wires anchored in concrete foundations buried 20′ in the ground. An elevator can carry two men to the tower top and back to the ground in 30 minutes.

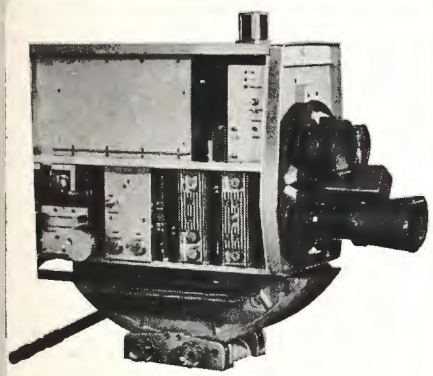
CATV for Alabama

Three CATV systems for use in Alabama are to be financed, engineered, and furnished by **Stromberg-Carlson Corp.** under a contract awarded by **West**

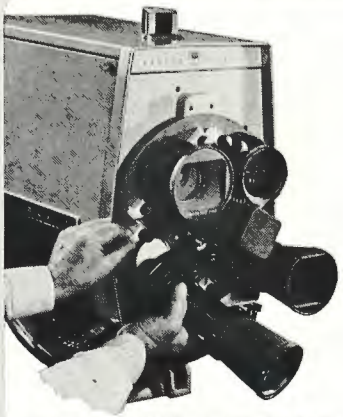
A FEW REASONS WHY YOU CAN'T BUY A FINER TELEVISION CAMERA ...AT ANY PRICE



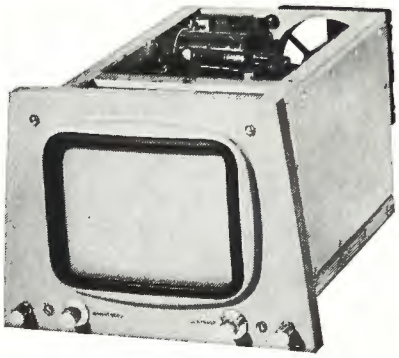
Impressive, designer-styled exterior. Clean lines, ultra-compact package houses field-proven Tarzian 3" Image Orthicon camera system. Highly portable. Easy to handle. Uses conventional camera cable.



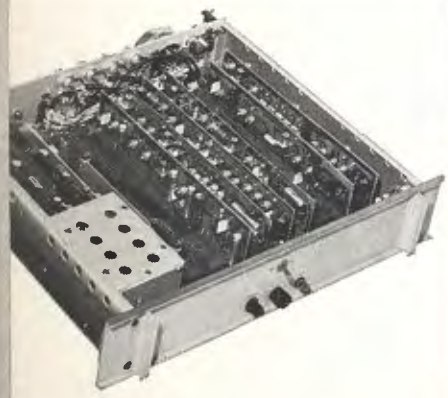
100% transistorized plug-in electronics for reliability and fast, convenient troubleshooting. Hinge out yoke assembly allows rapid change of IO tube.



Built-in remote iris control. Quick-change lens insert system accepts variety of lenses, fixed focus and zoom.



Plug-in, self-contained 8-inch viewfinder assembly, interchangeable with other Tarzian live cameras. All circuits accessible without removing viewfinder.



Modular proc amp completes camera system. (Also interchangeable between cameras.) Totally transistorized electronics on plug-in circuit cards. Compact, highly portable.

SPECIFICATIONS

Scanning rate	525 lines, 30 frames, 60 fields, 2:1 interlaced
Line repetition rate	15,750 cycles per second
Resolution (horizontal)	600 lines picture center 500 lines picture corners
Signal-noise ratio	Limited only by image orthicon
Remote iris control	Time for full range, 3 seconds accuracy of setting ± 0.25 lens stop
Output signals	Horizontal drive, 4 volts ± 0.5 volts; Vertical drive, 4 volts ± 0.5 volts; Sync, 4 volts ± 0.5 volts; Blanking, 4 volts ± 0.5 volts. Viewfinder video (external) 0.7 volts intercom audio.
Viewfinder size	8" tube
Intercom	Dual transistorized

These are but a few reasons. For all the rest, call, or write, for 8-page brochure, "3000L 3" Image Orthicon Camera System."

SARKES TARZIAN

BROADCAST EQUIPMENT DIVISION BLOOMINGTON, INDIANA

Circle Item 31 on Tech Data Card

Alabama TV Cable Company, a subsidiary of Alabama Telephone Company. The systems will serve subscribers in Sulligent, Winfield, and Vernon, Ala. The company already operates a CATV system in Hamilton, Ala. Five channels will be available to Sulligent and Winfield, and six to Vernon. Towers 200′ high will be erected at the three locations for mounting the antennas to pick up channels from Columbus, Miss.; Birmingham, Ala.; and Tupelo, Miss. Vernon will also receive a channel from Meridian, Miss.

Broadcasters Considering Automation

Approximately two-thirds of the nation's AM and FM broadcasters are considering automation, 27% actively and 38% after further refinement. This conclusion was drawn from the 680 responses to a nationwide survey conducted for **International Good Music, Inc.** The respondents included 234 network-affiliated stations, 189 AM directional, 423 AM nondirectional, 238 FM-only, and 25 AM-FM stations. By population of city of license, 26% are located in areas of 100,000 or more, including 11 respondents in areas above 2½ million population; 46% in areas of 10,000 to 100,000; and 28% in areas of less than 10,000.

Six TV Stations to Transmit From Hancock Center

Six Chicago television stations plan to locate their transmitting antennas atop the 100-story **John Hancock Center.** The stations are: **WGN-TV** (channel 9), **WMAQ-TV** (channel 5), **WBBM-TV** (channel 2), **WTTW** (channel 11), **WXXW** (channel 20), and **WSNS** (channel 44). The stations are expected to begin transmitting from the top of the $95 million structure on North Michigan Avenue during the summer of 1968.

Plans, still subject to approval by the Federal Aviation Agency, call for twin transmission towers 2049′ above sea level, or 1449′ above ground. Each TV tower would rise 344′ above the roof. Also proposed is a 100′ common FM radio antenna located between the two TV towers. This antenna is designed to serve 15 stations. Cost of the TV facility is estimated at $5 million.

WGN-TV has transmitted from the top of the Prudential Building since 1955; its present antenna height is 914′. WMAQ-TV has operated from the Kemper Insurance Building since 1948 with an antenna height of 749′, and the WBBM-TV antenna (height 683′) has been atop the American National Bank Building since 1948. WTTW and WXXW, educational stations, transmit from atop the 1000 Lake Shore Drive Building. WSNS is a new station which has not begun operation.

300-Mile CATV System

Opening ceremonies for the 300-mile Greater Harrisburg CATV system were scheduled for early December. The system, built by **Jerrold Electronics,** is to serve Harrisburg and 17 surrounding communities in Dauphin and Cumberland Counties and will have a potential of 55,000 subscribers. CATV is not completely new to the Harrisburg area; **Perfect TV** has operated a five-channel system in a small section of the city since 1951. This company plans to connect its present 500 subscribers to the new system as soon as it is completed. Initially, the system will provide 11 TV channels, including a locally originated time-weather-music channel, and six FM radio stations. While five or more UHF channels (including an educational TV channel from Hershey, Pa.) will be carried on the Harrisburg cable, subscribers will need no UHF converters to watch them. All UHF channels are converted to unused VHF channels at the CATV head-end.

National Commission on ETV

A national commission on educational television to be established and financed by the **Carnegie Corporation of New York** has received approval of President Johnson. It will conduct a broad study of educational television to define its role in America and make recommendations for its future.

Dr. James R. Killian, Jr., chairman of the corporation of the Massachusetts Institute of Technology, will be chairman of the Commission. Other members are:

Shure's remarkable new SM50 omnidirectional dynamic microphone is SELF-WINDSCREENED! It is strikingly immune to wind noises and explosive breath sounds—making it ideal as a dependable "workhorse" microphone for remote interviews, news, sports pick-ups and a variety of field and studio applications. The five-element built-in windscreen makes it virtually pop-proof in close talking situations. And unlike other "built-in" windscreens, this one is "unitized" and self-contained with no bits or pieces to re-assemble after cleaning. In fact, you can actually rinse dirt, saliva, lipstick and other screen-clogging foreign matter out of the windscreen assembly under running water as often as needed—or replace the "unitized" assembly if necessary in a matter of seconds.

Additionally, the SM50 is the cleanest sounding professional microphone at anywhere near its price class. It delivers highly intelligible, natural and pleasing speech and vocal music that is especially full-bodied and rich in the critical mid-range.

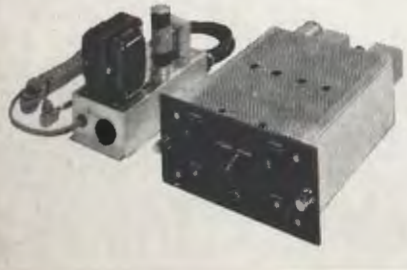
It is extremely rugged and will require little or no down time as the years go by. Too, when comparing it to other moderately priced omnidirectionals, it is lighter in weight, supremely well-balanced for "handability," has a detachable cable, and a rubber mounted cartridge for minimizing handling noises. The SM50 is worthy of your most serious consideration.

For additional information, write directly to Mr. Robert Carr, Manager of Professional Products Division, Shure Brothers, Inc., 222 Hartrey Avenue, Evanston, Illinois.

SHURE SM50

OMNIDIRECTIONAL DYNAMIC MICROPHONE

SHURE STATION-TESTED AUDIO CIRCUITRY EQUIPMENT



Shure stereo equalizer and preamplifiers are praised as MAJOR contributions to upgrading station quality by broadcasters.

SE-1 Stereo Transcription Preamplifier
Provides precise RIAA equalization from magnetic phono reproducers at line levels. Separate high and low frequency response trimmers. Lowest distortion, noise level, susceptibility to stray RF fields.

M66 Broadcast Stereo Equalizer
Passive equalizer compensates recorded frequency to three playback characteristics: RIAA, flat, roll-off. Provides precise equalization from magnetic pickup at microphone input level.

Circle Item 34 on Tech Data Card

James B. Conant, former president, Harvard University; Lee A. DuBridge, president, California Institute of Technology; Ralph Ellison, author; John Hayes, president, Post-Newsweek Stations; David Henry, president, University of Illinois; Oveta Culp Hobby, president, The Post, Houston, Texas; J. C. Kellam, president, Texas Broadcasting Corporation and president, Board of Regents, State Senior Colleges of Texas; Edwin Land, president, Polaroid Corporation; Joseph McConnell, president, Reynolds Metals Company; Terry Sanford, former Governor of North Carolina; Rudolf Serkin, concert pianist; Leonard Woodcock, vice-president, United Automobile Workers of America.

The Commission will recommend lines along which noncommercial television stations might most usefully develop during the years ahead. It will consider their financial problems and make recommendations as to how these problems might be met. It will focus its attention principally, although not exclusively, on community-owned channels and their services to the general public.

The Commission is expected to take twelve to fifteen months to make its study, after which time it will publish a report and recommendations. The Commission's headquarters will be located at 26 New Street, Cambridge, Massachusetts.

Group Seeks Better TV Reception

The public will enjoy clearer, ghost-free pictures, advertisers will get more for the $2 billion plus they now spend on television, and television stations will be able to add to their viewing audience —these are the announced objectives of the newly formed **American Institute for Better Television Reception.** This group will work in conjunction with distributors, retailers, equipment manufacturers, and television stations in major markets across the country. In addition, the Association of Maximum Service Telecasters —an association representing over 160 television stations operating at maximum transmitting power—has encouraged its members to promote adequate home receiving antennas and is providing coordination assistance for those members who are participating on a local basis with the Institute's campaign.

The Institute was created to solve a problem long frustrating many television-station engineers: how to get the public to install their sets so they can see pictures as good as those being transmitted. The Institute believes that in the majority of instances this can be done with the installation of adequate antennas.

Field work of the Institute is carried on by field representatives of the various manufacturers who cooperate with local television stations in setting up orientation and training meetings with distributors, dealers, and servicemen. At these meetings, the men who are responsible for the sales, installation, and maintenance of television sets are given intensive briefings on the purposes and objectives of the Institute. A certificate then issued the dealer is serial-numbered and states he has been designated an Accredited Reception Specialist by the AIBTR. The certificate carries the AIBTR seal and remains the property of the AIBTR; it may be removed if complaints are made against the dealer.

The consumer-education campaign includes public-service spots carried by the various cooperating stations. It is expected that as the program progresses, displays and demonstrations will be developed to show the public how much better their television sets work when properly installed with an efficient outdoor antenna.

To Manufacture CATV Equipment

A new company to produce and market Community Antenna Television (CATV) equipment has been organized by **Kaiser Industries Corp.** and **Cox Broadcasting Corp.** The new company, to be known as the **Kaiser-Cox Corp.,** will be based in Phoenix, Arizona. It will be owned equally by Cox Broadcasting and the Kaiser Aerospace & Electronics Corp. subsidiary of Kaiser Industries.

The Kaiser-Cox organization will immediately establish warehousing facilities and district sales offices in St. Louis, Pittsburgh, Atlanta, Oakland, Phoenix, Portland, and additional locations yet to be selected. The company's line of solid-state equipment will be manufactured in Phoenix.

CATV's Consolidated

A new interstate Community Antenna Television system has resulted from a consolidation of operating companies in Washington, Oregon, and California. All of the companies were already held in overlapping or associated ownership. The new company, **Tele-Vue Systems, Inc.,** will operate systems in Seattle and Everett, Washington; Roseburg, Grants Pass, Medford, Ashland, and Klamath Falls, Oregon; and Dublin and the San Ramon Valley, Pleasanton, Corte Madera, Larkspur, San Rafael, Marinwood, Terra Linda, Santa Venetia, Petaluma, Antioch, and Livermore, all in the San Francisco Bay area of California.

Officers of the newly-formed company are Homer A. Bergren, Seattle, president; Lindsey Spight of San Francisco, executive vice-president for the southern division; Fred G. Goddard of Aberdeen, Washington, executive vice-president for the northern division; and William Montgomery of Seattle, secretary and treasurer.

PERSONALITIES

Robert W. Frierson has been named engineering manager of **Magnetics,** a Division of **GJM, Inc.** As engineering manager, Mr. Frierson will have total responsibility for all magnetic head and drum design. A graduate of the University of California at Berkeley, he brings some 15 years of magnetic-recording experience to Magnetics. He is a member

of the Institute of Electrical and Electronic Engineers and the American Society of Astronautical Engineers.

David S. Newborg has been appointed manager, antenna merchandising, for the Broadcast and Communications Products Division, **Radio Corporation of America.** In his new post, Mr. Newborg succeeds Joseph P. Ulasewicz, who has been transferred to the RCA International Division. He will have product responsibility for radio and television broadcast antennas.

Mr. Newborg joined RCA in 1943 following his graduation from the Georgia Institute of Technology with a bachelor of science degree in electrical engineering. During his undergraduate years, he held full-time technical jobs with Atlanta radio stations.

PROPERTY TRANSACTIONS

Radio Stations **WZIP** and **WZIP-FM,** Cincinnati, Ohio, have been sold by **Greater Cincinnati Radio, Inc.** (owned by the Waukegan, Illinois News Sun) to the **Zanesville, Ohio Publishing Company.** WZIP is a 1000-watt daytimer on 1050 kc, and WZIP-FM is on 92.5 mc with 70 kw. The sale price was $367,500. The purchaser also owns WOMP AM-FM, Bellaire, Ohio; WNXT AM-FM, Portsmouth, Ohio; WHIZ AM-TV, Zanesville, Ohio; and WTAP AM-FM-TV, Parkersburg, West Virginia. The seller continues to own WKRS, Waukegan, Illinois.

The sale of radio station **KTHS,** Berryville, Arkansas has been announced by Ernest Howard, president of **Ozark Radio and Equipment, Inc.,** licensee of the station. The purchaser is **KTHS, Inc.,** Maurice F. Dunne, Jr., President. Mr. Dunne is a Lake Forest, Illinois business man and will be associated in this venture with Charles Earls, formerly manager of KAWA, Waco, Texas. KTHS is a 1000-watt daytime station operating on 1480 kc. The sale price was $50,000.

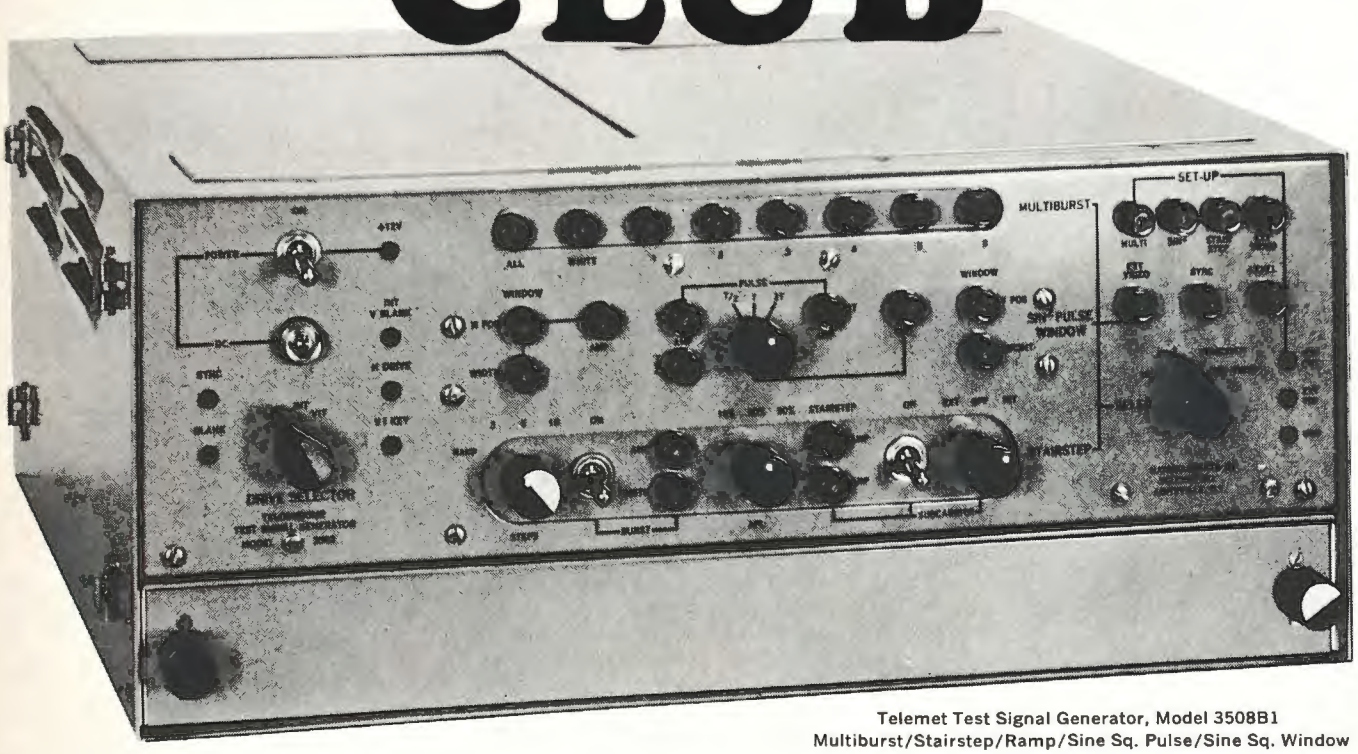
Radio Station **KFHA,** Tacoma, Washington has been sold, subject to FCC approval, by **Radio Sales Corporation** to **Lloyd Burlingham** for a total consideration of $84,000. Radio Sales Corporation has owned and operated KFHA since June 7, 1961. Mr. Burlingham owns KTOB, Petaluma, California; WIXN, Dixon, Illinois; and KNOG, Nogales, Arizona. KFHA operates with 1000 watts, daytime only, on 1480 kc.

Radio Station **KSEE,** Santa Maria, California, has been sold, subject to FCC approval, by **Cal-Coast Broadcasters,** to **Frank G. Macomber,** White Plains, New York, for a total consideration of $153,750. Edward E. Urner, owner of Cal-Coast, was founder, vice-president, and general manager of KLYD radio and television, and vice-president and general sales manager of KERO, both Bakersfield, California. He is presently employed by Crowell-Collier Broadcasting Corporation as general manager of their San Francisco-Oakland outlet, **KEWB.** Mr. Macomber has been associated in a program capacity with stations in Virginia, North Carolina, Texas, and Vancouver, B. C.

KSEE operates with 1000 watts, daytime only, on 1480 kc and has been on the air since 1961.

WJUD, a 1000-watt daytimer on 1580 kc, broadcasting from St. Johns, Mich., has been purchased by Mr. **Robert D. Ditmer** from **Clinton County Broadcasting, Inc.** Mr. Ditmer is currently general manager of Radio Station WHGR, Houghton Lake, Michigan. Sale price is $82,500. ▲

JOIN THE CLUB



Telemet Test Signal Generator, Model 3508B1
Multiburst/Stairstep/Ramp/Sine Sq. Pulse/Sine Sq. Window

OVER 300 of these units are in daily use throughout the television industry—and this doesn't include the individual test signal generator modules (3501, 3502, 3503, etc.), of which hundreds have been sold.

This kind of popularity doesn't just happen... it's the combined result of awareness of customer requirements, capable engineering, quality production and continuing service.

If you're not already a member of the Model 3508 club, why not join now? It costs no more to go first class.

GIANNINI SCIENTIFIC CORPORATION GSC

TELEMET COMPANY

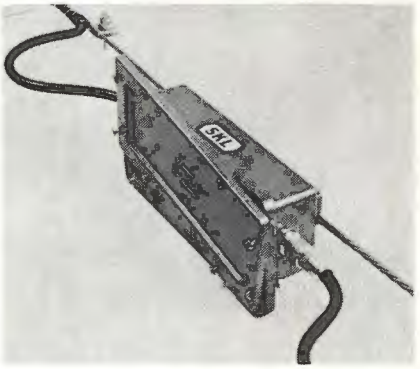
185 DIXON AVENUE, AMITYVILLE, N.Y. • PHONE (516) 541-3600

NEW PRODUCTS

Vidicon Camera Chain

A vidicon camera chain built around the GE Model TE-14 camera is designated Model TMC-214 by **Tele Mation, Inc.** The addition of the Model TMV-101 camera-control unit converts the TE-14 to EIA and FCC specifications. A 5" transistor viewfinder, Model RE-575, is available for live applications. The TMC-214 is intended to provide solid-state circuitry, high resolution, low power consumption, and stable performance for live, remote, or film applications in educational or broadcast installations.

Circle Item 63 on Tech Data Card



Transistor Trunk Amplifier

The Model 265 trunk amplifier is a high-output transistorized trunk amplifier with full 12-channel response. Its built-in temperature compensation, gain and tilt controls, AC cable-powering, and power regulation adapt it to both new system design and modernization of existing systems. The unit is designed to compensate for all losses in 20 db of cable over the band of 54 to 216 mc from −20°F to +120°F. Low noise output and low cross-modulation permit the cascading of 50 or more amplifiers. The **SKL** Model 265 is housed in a waterproof cast-aluminum box with a captive cover; it may be mounted on the messenger or, with a bracket, on a pole. The unit is equipped with special sealed Type N connectors.

Circle Item 64 on Tech Data Card

Video Waveform Monitor

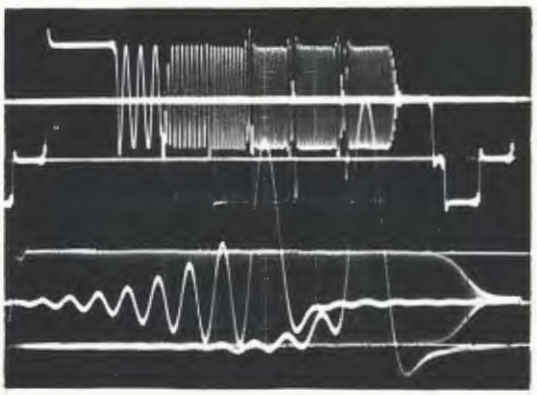
A cabinet-model version of its RM529 video waveform monitor is being manufactured by **Tektronix, Inc.** The Type 529 is designed for side-by-side mounting with a picture monitor in standard racks; it requires 8¾" of rack space. A field case is offered as an optional accessory. The monitor features extensive use of semiconductors and is engineered to provide stable displays of vertical-interval test signals with adequate brightness even at the fastest sweep speeds. A line selector can be used to choose any line for display; the displayed line as viewed on the associated picture monitor is automatically intensified by a brightening pulse. No modification to the picture monitor is required.

Other features include positive field selection and back-porch DC restoration which is not affected by color burst. Power consumption is 80 watts, and no fan is used.

Four different frequency-response characteristics, required for analyzing VIT signal displays, including sine-

5 QUESTIONS

most engineers ask before they buy our solid-state transmitter COLOR Phase Equalizer & Low Pass Video Filter



TYPICAL SYSTEM OUTPUT — SWEEP, MULTIBURST, 2 T AND T PULSE

1. What is the overall Frequency Response of the Equalizer System including the Video Low Pass Filter?

Ans. ± 0.5 db 10 cps to 4.0 Mc/s; -1.0 db max. at 4.2 Mc/s; -20.0 db min. at 4.75 Mc/s; more than 20.0 db down above 4.75 Mc/s.

2. Will it work with my transmitter? What type of variable delay does it have?

Ans. This new system has 50 delay positions in each of the LF, HF and Notch Equalizers, approaching continuously variable delay — adequate to meet any phase correction requirement of your transmitter.

3. How much rack space does it take?

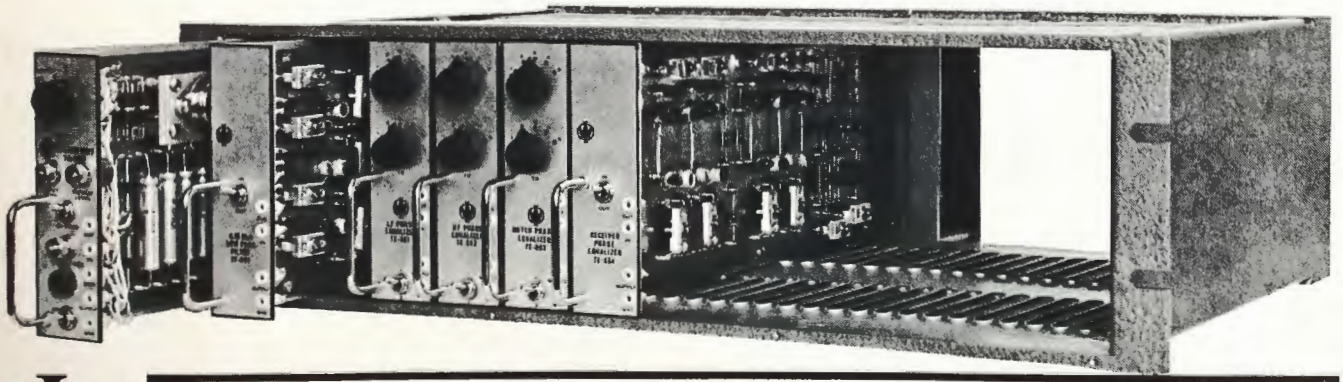
Ans. A Complete system for a transmitter occupies only half of a 5¼" rack frame.

4. Does it have by-pass facilities?

Ans. Yes, automatic by-pass for the entire system, and selectable by-pass for video low pass filter, receiver equalizer, and variable delay modules.

5. How much does it cost, and how long is delivery?

Ans. The entire system is only $3,450 (including notch equalizer) F.O.B. Linden, and we are currently making delivery from stock.



WARD ELECTRONIC INDUSTRIES

1414 EAST ST. GEORGE AVE., LINDEN, N. J. 07036 • (201) 925-4690

Circle Item 45 on Tech Data Card

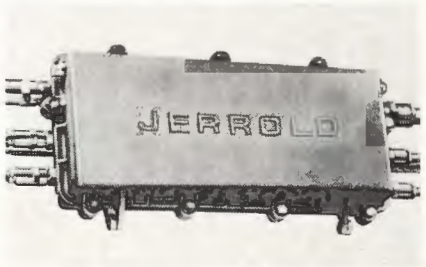
squared testing, can be selected by a front-panel control. A special graticule is provided for transmitter modulation monitoring. The Type 529 can be used in conjunction with color process amplifiers for YRBG displays or RBG displays. Price of the monitor is $1100.

Circle Item 65 on Tech Data Card

Headset With Microphone

TV Special No. 106040 Commentator's Headset was specially designed for broadcast-studio use. Impedance of the noise-canceling dynamic microphone is 150 ohms. The 275-ohm receiver is housed in a hard-shell circumaural earcup fitted with a foam-filled earcushion. **Roanwell Corp.** supplies the set with 5' 4-conductor cordage; the microphone circuit is shielded.

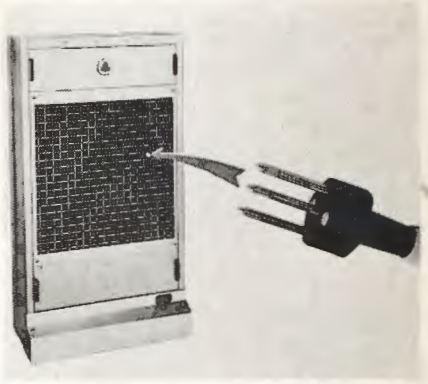
Circle Item 66 on Tech Data Card



Solid-State CATV System

An all-transistor CATV system for carrying 12 TV channels through up to 50 amplifiers at −57 db cross-modulation is being sold under the name "Starline" by **Jerrold Electronics Corp.** A feature of the system is compact, unitized stations. All equipment for each complete main station is contained within a single aluminum housing designed to provide an airtight, waterproof, vaporproof, and dustproof enclosure. Starline stations are usually messenger-mounted. Changes in gain-control settings cause virtually no deterioration in noise figure or cross-modulation, so amplifier spacing may be varied. The equipment line includes a series of "Feeder Makers," which plug into the bridging-amplifier stations to provide a choice of one, two, three, or four line outputs. Other features include all silicon transistors, seized center conductors, and full-wave power rectification.

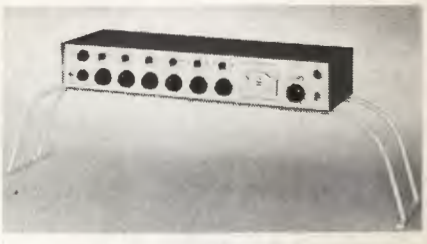
Circle Item 67 on Tech Data Card



Distribution Panel

This crossbar distribution panel for television picture signals is designed to provide low crosstalk so that a 6-conductor sound-and-picture matrix of up to 60 input and 60 output channels can be switched. The basic panel, developed by an **ITT** Swiss subsidiary, accommodates 20 inputs and 20 outputs of 6 wires each. Switching is by insertion of a special plug at the crosspoint of the two desired channels. A lamp in the head of the plug can be provided to signal active channels. A 20-by-20-channel panel measures 20.5" x 19.3".

Circle Item 68 on Tech Data Card



Compact Console

This console—built for use in crowded control rooms, for remote broadcasts, or in other applications where compact construction is desirable—contains dual turntable, tape, and microphone inputs and program, monitor, and cue outputs. Gain potentiometers are also included in the system for control of all microphones; turntable and tape outputs; and monitor, cue, and master volume. Additional serviceability is provided by "cue-

you can

use your television camera

1. for both remote and studio telecasts
2. in the widest possible range of light levels
3. with zoom or turret-mounted lenses (remote iris optional)
4. with any one of a wide variety of I.O. pickup tubes

if it's General Electric's new PE-26...

the *only* truly "universal" monochrome I.O. camera on the market today. It weighs only 70 pounds, requires a mere 170-watts of power, takes up less than 2.5 cubic feet, is self contained except for remote control panel and monitoring (the monitoring and control panel for a two-camera system takes only 2' of rack space)...and is completely transistorized (and we mean completely).

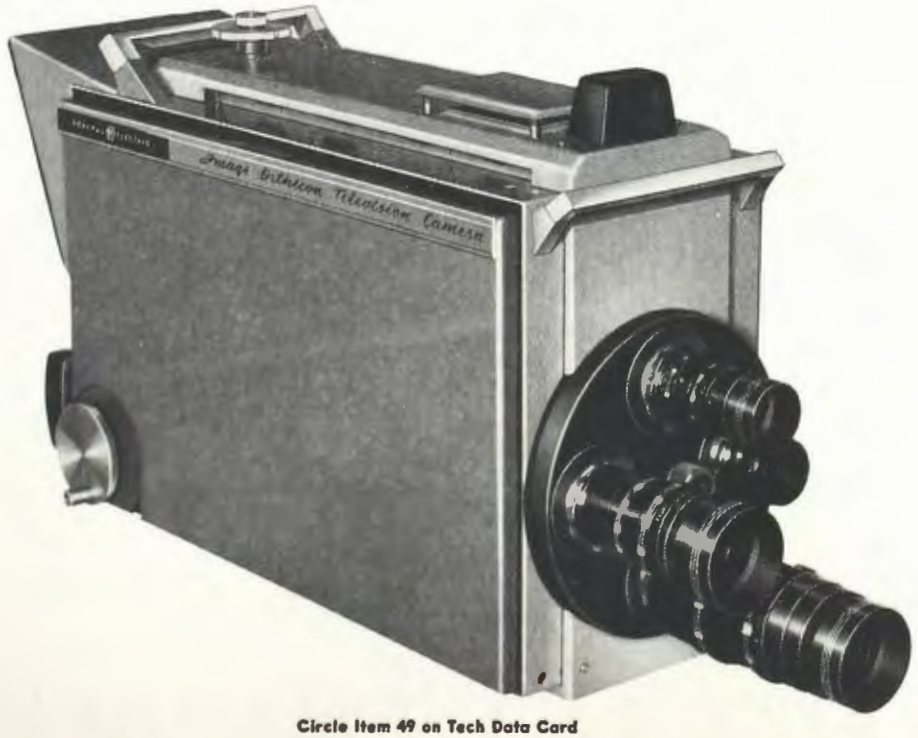
There's no other camera like it. And like it you will, after you see it in action. You can, simply by contacting your G-E Broadcast Equipment Representative, or: General Electric Company, Visual Communications Products, #7-315, Electronics Park, Syracuse, N.Y. 13201.

GE-20

Visual Communications Products

GENERAL ELECTRIC

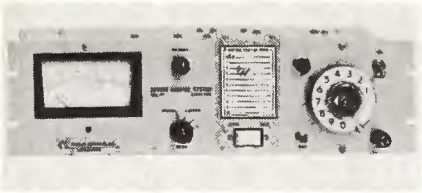
Electronics Park, Syracuse, New York



Circle Item 49 on Tech Data Card

on-off" switches which allow for cuing either tapes or records during broadcasts. A VU meter is included. The unit is of modular construction. The console is supplied with removable legs which are designed to straddle two turntables. It is sold by **United Radio Supply, Inc.**

Circle Item 69 on Tech Data Card



Transmitter Remote Control

The Model WRC-10T is a 10-channel solid-state transmitter remote-control system that requires only a single DC-pair telephone circuit between the studio and transmitter sites. Raise, lower, control, and fail-safe functions are carried on the same circuit simultaneously with return telemetry information. Temperature-stabilized inductors and capacitors are used for reliable performance. Gold-plated circuits are printed on epoxy/glass-fiber cards. A vertical rack space of 5¼" is required for the transmitter and studio control units. A single transistor type is employed in all circuits. Also, a line of accessory kits is available for motor tuning, plate-current measurement, tower-light indication, etc. This remote-control system is a product of **Moseley Associates, Inc.**

Circle Item 70 on Tech Data Card

Electronic Tape Editor

An electronic editing accessory is now available as optional equipment with the **Ampex** VR-660B portable Videotape recorder. The device, called Edicon, permits increased flexibility in production of program material for broadcast or closed-circuit applications. Push-button editing of moving recorded tape is possible without stopping to splice or cut. Long or short insertions in existing programs may be substituted, and scene-by-scene assembly of new programs with no picture disturbance between cuts is possible.

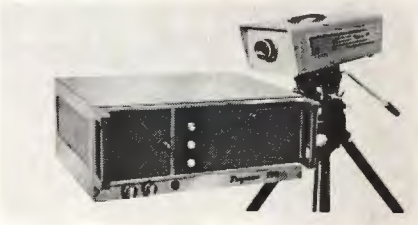
The VR-660B recorder is priced at $11,500, and the editing accessory is priced at $1000. Other accessories available with the VR-660B include continuously variable slow motion and a special control device which permits complete remote operation of the recorder.

Circle Item 71 on Tech Data Card

Solid-State TV Monitors

Transistorized circuitry and plug-in modular construction are design features of the TPB Series of television monitors. The **Miratel Electronics, Inc.** series is available in 8" through 17" sizes with custom-chassis, rack-mounting, or standard cabinet configurations.

Circle Item 72 on Tech Data Card



I-O Camera

The Rayscan 150 image-orthicon television camera is a two-piece system with fixed scan rates from 525 to 1023 lines. The camera has been designed so that, by choice of pick-up tubes, pictures may be obtained from scenes illuminated only by starlight, yet with adequate bandwidth to obtain 900 TV lines horizontal resolution with 875 scan lines per frame. The camera weighs 28 lbs and measures

5½" x 7½" x 20". The camera control measures 7" x 17" x 17". The **Raytronics** system draws 175 watts. Accessories include EIA synchronization, a selection of optics, and automatic light control.

Circle Item 73 on Tech Data Card

Stop-Motion Video Recorder

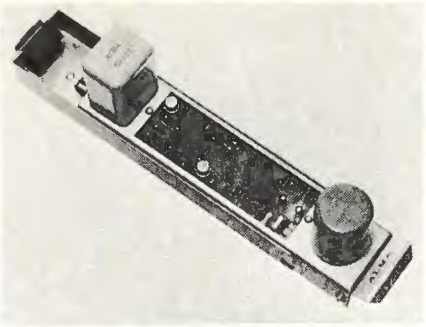
Playback of TV tapes in slow motion, stop motion, reverse motion, and double-speed motion is available in a portable TV recorder produced by **Precision Instrument Co.** Designated the PI-7100, the 90-lb device allows forward and reverse playback at continuously variable speeds from 0 to 16" per second—nominally twice recorded speed. The instrument features stacked coaxial reels and helical-scan, closed-loop recording. It is fully transistorized, has a 3.5-mc bandwidth, and can record up to 96 minutes on a single 10½" reel of 1" tape. Two auxiliary tracks for audio commentary are individually recordable and erasable.

Circle Item 74 on Tech Data Card

SCA Receiver

The S/6 SCA multiplex receiver is completely solid-state and of modular design. The four printed-circuit strips (RF, IF, subcarrier detector, and amplifier) can be removed and replaced, since all the interconnections are made with plug-in jumpers. This approach allows repair by inexperienced help using the substitution method. It also allows the receiver to be updated or modified for special application without the purchase of an entire unit. The S/6, manufactured by **Dayton Electronic Products Co., Inc.,** includes a 15-watt amplifier and is priced at $165.

Circle Item 75 on Tech Data Card



Preamplifier/Amplifier

The Model AE-2500 differential audio

amplifier pictured here offers such characteristics as selectable gain (48 to 70 db by the insertion of a single resistor). Specifications are: total harmonic distortion .05% at any test frequency and measured at +25 dbm; output noise equivalent to an input of −127 db when strapped for 70 db gain and terminated in 150 ohms; frequency response within ½ db from 20 cps to 20,000 cps at +25 dbm. The **Alma Engineering** amplifier is also available with RIAA equilization.

Circle Item 76 on Tech Data Card

RF Calorimeter

Measurement of RF power to 500 mc is possible with the RF Termaline® coaxial load resistors and their companion calorimetric assemblies made by **Bird Electronics.** The calorimeter device is placed in series with the coolant flow of the load resistor. The input-to-output temperature differential at a constant flow rate yields power data from a chart; depending on the power level, probable error is as small as 2%.

These calorimetric assemblies are self-checking at DC or 60-cps AC and are not affected by ambient conditions. The coaxial load resistors are designed for a VSWR below 1.1 from DC to 500 mc, with 3⅛" flanged or unflanged line connectors. Continuous power ratings of 15 kw, 25 kw, and 50 kw are available with matching thermometers and flow indicators. ▲

Circle Item 77 on Tech Data Card

ENGINEERS' TECH DATA

AUDIO & RECORDING EQUIPMENT

80. ATLAS SOUND—Catalog 565 illustrates and describes public-address loudspeakers, microphone stands, and accessories for commercial sound applications.

81. CBS LABS—Literature on the "Volumax" automatic peak controller and the "Audimax III" solid-state automatic level control.

82. QUAM—General catalog No. 65 lists speakers for color-TV replacement, PA systems, high-fidelity, and general replacement.

83. SONY—Full-color catalog describes 1966 line of tape recorders and full recording accessories.

84. SPARTA—Catalog sheet details new tape-cartridge system; new-product brochure is also available.

85. UNIVERSITY SOUND—Cardioid, dynamic, and professional miniature microphones are listed in 1966 catalog.

86. VIKING OF MINNEAPOLIS—Pictorial folder shows plug-in components, mechanism, outside views, and specification chart for Model 230 tape transport.

CATV EQUIPMENT

87. JERROLD—Eight-page brochure features "Starline" solid-state unitized CATV systems.

88. SKL—Folder lists and provides specifications for head-end, trunk, and distribution equipment; accessories; and special products for CATV use.

COMPONENTS & MATERIALS

89. DENSON—Catalogs 965S-1 and 965S-1 SPECIAL feature new, used, and surplus radio and TV broadcasting equipment. The SPECIAL edition includes schematics and construction features.

90. MULLARD—Flier sheets provide cross-reference data and price list on tubes for special-purpose, industrial, and broadcast applications.

91. SWITCHCRAFT—New-product bulletin No. 155 describes Series X "Glo-Button," a nonelectrically illuminated switch.

MICROWAVE DEVICES

92. MICRO-LINK—Planning guide covers 2500-mc ITV systems. Brochures and specification sheets provide data on Model 420A portable link and Model 600 fixed link.

93. MICROWAVE ASSOCIATES—Sixteen-page brochure, bulletins, and technical report detail applications and specifications for TV-broadcast solid-state microwave-relay equipment.

MOBILE RADIO & COMMUNICATIONS

94. MOSLEY ELECTRONICS—Catalog lists complete line of 1966 Citizens-band equipment.

95. SPRAGUE—Circular M-853 describes SK-1, SK-10, SK-20, and SK-30 "Suppressikits" for vehicles with alternators or DC generators.

RADIO & CONTROL ROOM EQUIPMENT

99. IGM—Full-color eight-page illustrated brochure shows monitor unit, timer module, punch-card reader, automatic network swticher, and other control-system units.

POWER DEVICES

96. HEVI-DUTY—Bulletin 7-22 supplies data on line-voltage regulator using saturable-core reactor.

97. PRECISE—Regulated power supply is illustrated and described in technical bulletin.

98. SOLA—Buyers guide VR-200 includes applications, theory of operation, and specifications for line-voltage regulators.

REFERENCE MATERIAL & SCHOOLS

100. CLEVELAND INSTITUTE—Booklet outlines courses in electronics, including those for broadcast engineering and FCC license preparation.

101. HOWARD W. SAMS—Literature describing popular and informative technical publications; includes latest catalog of technical books.

STUDIO & CAMERA EQUIPMENT

102. CLEVELAND ELECTRONICS — Data concerns modifications using new yoke assembly to update 3" image-orthicon camera.

103. COLORTRAN—General catalog for 1966 includes company line of lighting accessories and dimming systems for motion-picture, TV, and still-photographic applications.

104. MOLE-RICHARDSON—Technical bulletins 102-107 illustrate line of quartz-iodine lights for studio use.

105. TELEPRO—Flier sheets describe twin-douser projection system and prompting system.

106. TV ZOOMAR—New literature features Autocam programed remote control pan and tilt equipment; literature describes lenses for IO and vidicon use.

TELEVISION EQUIPMENT

107. COHU—Technical data sheet No. 6-382 describes video-switching matrix system. Information includes typical input-to-output data and performance specifications.

108. COLORADO VIDEO—Sheet gives data for the Model 301 video analyzer which displays TV waveforms directly on picture monitors.

109. FAIRCHILD—Photographs and abbreviated specifications for cameras, monitors, and accessories are given in catalog for CCTV equipment.

110. SYLVANIA—Fold-out brochure lists applications, equipment complement, and specifications for mobile TV van.

111. THOMSON-HOUSTON — Brochure features solid-state color flying-spot scanner. Block diagram and specifications list are included.

112. VITAL—Data sheets give specifications of Model VI-500 stabilizing amplifier, Model VI-10A video distribution amplifier, and Model VI-20 pulse-distribution amplifier.

TEST EQUIPMENT & INSTRUMENTS

113. HOLLAND ELECTRONICS — Bulletins describe 75-ohm test terminations for coax; type N, PL 259, and BNC connectors are included.

114. WORKMAN—Catalog sheet No. 92C describes transistor-diode checker.

TOOLS

115. ENTERPRISE DEVELOPMENT—Bulletins feature Models 300 and 100A desoldering-resoldering iron for PC-board use.

TRANSMITTER & ANTENNA DEVICES

116. BAUER—Block diagram and specifications for 7500-watt FM transmitter are given on data sheet.

117. FORT WORTH TOWER—Brochure describes line of factory-built communications buildings.

118. GATES—Brochure depicts transcription turntables and accessories. Flier sheets give specifications for solid-state monitor amplifier and Model FM-1G 1,000-watt FM transmitter.

119. MOSELEY ASSOCIATES—Six-page brochure describes new solid-state 10- and 21-channel remote-control systems.

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Advertising rates in the Classified Section are ten cents per word. Minimum charge is $2.00. Blind box number is 50 cents extra. Check or money order must be enclosed with ad.

The classified columns are not open to the advertising of any broadcast equipment or supplies regularly produced by manufacturers unless the equipment is used and no longer owned by the manufacturer. Display advertising must be purchased in such cases.

EQUIPMENT FOR SALE

Audio Equipment bought, sold, traded. Ampex, Fairchild, Crown, McIntosh, Viking. F. T. C. Brewer Company, 2400 West Hayes Street, Pensacola, Florida. 3-64 tf

Television/Radio/communications gear of any type available. From a tower to a tube. Microwave, transmitters, cameras, studio equipment, mikes, etc. Advise your needs—offers. Electrofind Co., 440 Columbus Ave., NYC. 212-EN-25680. 8-64 tf

COMMERCIAL CRYSTALS and new or replacement crystals for RCA, Gates, W. E., Bliley, and J-K holders; regrinding, repair, etc. BC-604 crystals; also service on AM monitors and H-P 335B FM monitors. Nationwide unsolicited testimonials praise our products and fast service. Eidson Electronic Company, Box 96, Temple, Texas. 5-64 tf

AMPEX 350 SERIES reconditioned capstan drive motors (BODINE NCH-33 only) $85.00 exchange. Send us your old one, or order for $100.00 and get $15.00 back after sending old one in. Ours have new bearings and rewound stator. Package motor well. TABER MANUFACTURING & ENGINEERING CO., 2619 Lincoln Ave., Alameda California. 1-65 12t

Everything in used broadcast equipment. Write for complete listings. Broadcast Equipment and Supply Co., Box 3141, Bristol, Tennessee. 11-64 tf

New and Reconditioned Remote Pickup and 2-way radio equip., Fire and Police Receivers. All brands and models. Sales Manager, Box 238, Phone 817-594-5171, Weatherford, Texas. 5-65 12t

Parabolic Antennas, 6' aluminum solid surface complete with dipole and mounting bracket. Now tuned for 1750 MC for $125 set. Tuned to 950 MC for $175 set. Sierra Western Electric Cable Co., 24th and Willow Streets, Oakland, California. Phone 415 832-3527. 12-65 tf

Cleaning out of surplus mica capacitors, all like new at 50% regular trade discount: G-5: two, .005; G-4: three, .0051, two, .0047; G-3: three, .0024; G-2: three, .0027; four, .001. Also Johnson unused 222-103 and 145-102-13 coils at big discount. No duty as all U.S. made. Geleco Electronics Ltd., 61 Curlew Drive, Don Mills, Ontario. Phone 444-5991. 1-66-1t

Trim 504 Audio Patch cords $4.00. Audio jack panels for 19" racks, 10 pair $8.95. Repeat coils 500-500 ohm flat to 20kc $4.00—Relay racks and equipment cabinets. Write for list. Gulf Electro Sales, Inc., 7031 Burkett, Houston, Texas. 1-66-1t

We need used 250, 500, 5K & 10K Watts AM Transmitters, No Junk. Broadcast Electronics Corp, 1314 Iturbide St., Laredo, Texas 78040. 1-66-tf

BT3-A 3 Kilowatt GE transmitter w/ 4BT1B-1 Amplifier, converted to amperex finals, spare tubes, GE limiter; $3800. RCA BC-2B console w/power supply. KTGM, 9805 East Iliff Ave., Denver Colorado. 1-66-1t

Record Cutter Head. Never used since rebuilt by Grampian in England. Send us your recording styli for regrinding. $6.50 each, fully guaranteed. Cook Recorders, 205 Ardys Place, Vista, California 92083. 1-66-1t

EQUIPMENT WANTED

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America's largest Radio and Television Employment Agency has immediate openings with stations in all parts of the country for experience Engineers. Send resume today to: Nationwide Broadcast Services, 645 North Michigan Avenue, Chicago, Illinois. 1-66 tf

Broadcast engineers and technicians wanted for operation in Samoa—studios and transmitters operation and maintenance—good living conditions and adequate family housing—write for interview, NAEB, R & D Office, 1346 Connecticut Avenue, Washington, D.C. 20036. 1-66-1t

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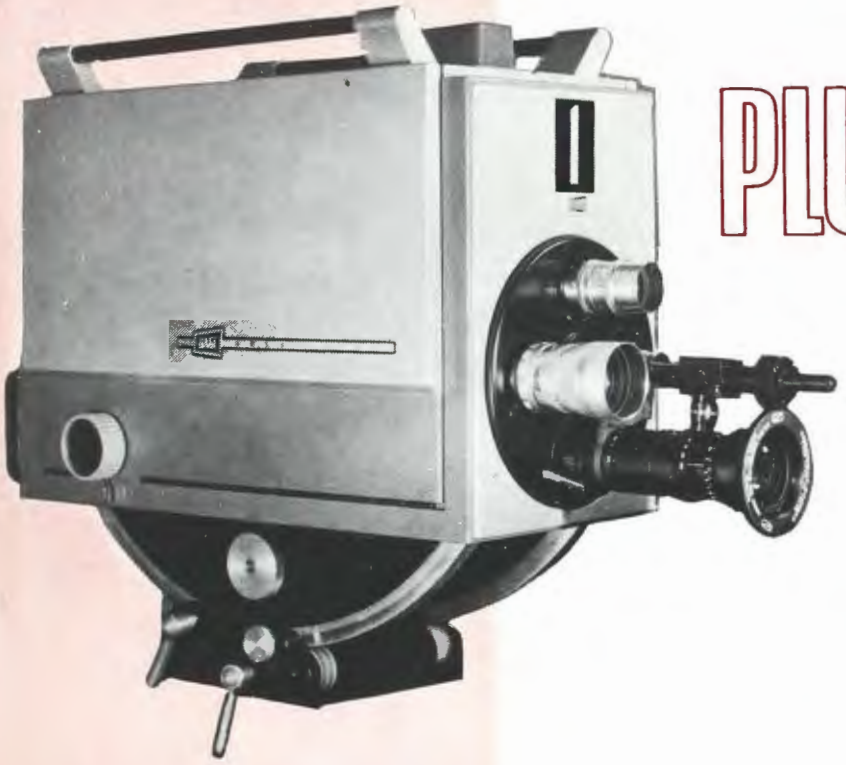

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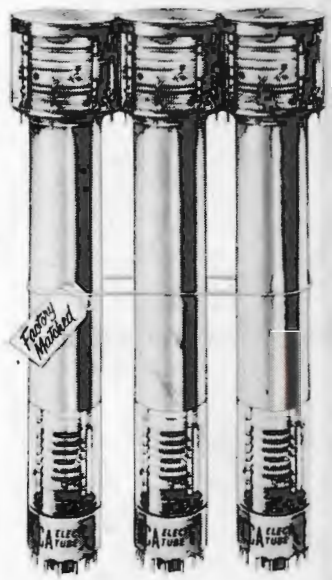
Circle Item 62 on Tech Data Card

How to climb aboard the color bandwagon easily, economically, with RCA-4415/S,-4416/S image orthicons...



Color TV is really rolling in high gear... And now, you may be facing the question of creating a color facility—with new studios, lighting, air conditioning and other equipment.

Being old-timers at color, we anticipated some of these facility problems and developed the RCA-4415/S, -4416/S, a matched-set of three image orthicons. They perform well in cameras for color at lighting levels usually available in black-and-white studios and eliminate the need for extra air conditioning equipment as well.

Another good feature of these tubes is that they behave more like the old faithful 5820A or 7293A's that you have been using in black and white during the past years. In the color camera, they can stand more over-exposure and are a little less finicky on the operating controls. For example, when you have a suntanned actress working in a gleaming white kitchen, you can operate with the highlights fairly far above the image orthicon knee without having the color picture going to pot.

We make up carefully matched sets consisting of two 4415/S Image Orthicons for the red and green channels, and one 4416/S Image Orthicon for the blue channel where a lot of "umph" in blue sensitivity is needed. The three mates of the set are matched to track very well and produce a nice uniform color picture. In addition, the sensitivities are balanced so that each tube is just about working at its maximum sensitivity and you are not throwing away extra light in the optical system to favor one low sensitivity channel. The result is good color pick-up at black-and-white studio lighting levels.

For further information about RCA Image Orthicons contact your RCA Broadcast Tube Distributor.

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