January, 1973/75 cents

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the technical journal of the broadcast-communications industry

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January, 1973 • Volume 15, No. 1

BROADCAST engineering®

The technical journal of the broadcast-communications industry

in this issue...

ABOUT THE COVER

This month's scene is a cold winter one. It reminds us that we should be prepared to report the weather. See articles on pages 18 and 22. (Cover design by Webb Streit)

DEPARTMENTS

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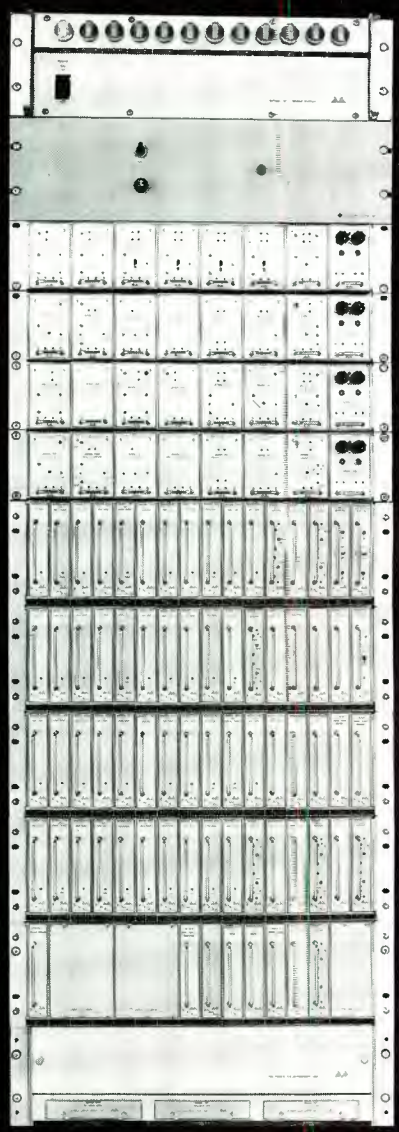

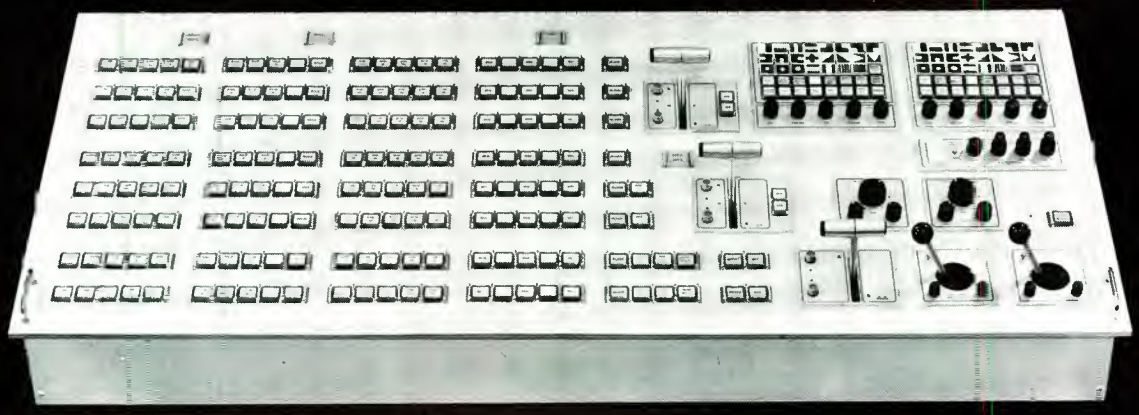

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DIRECT CURRENT FROM D. C.

JANUARY, 1973

by Howard T. Head

GAO Critical of FCC Inspection and Monitoring

The General Accounting Office (GAO) has released a report highly critical of the Commission's inspection and monitoring procedures. The GAO is the Congressional "watchdog" agency which reviews the efficient use of public funds.

The GAO report finds the Commission's monitoring activities "largely ineffective", principally because of the almost complete absence of monitoring capability for VHF and UHF signals in the large metropolitan areas, where most land mobile activity is concentrated. This gap will be bridged to some extent when the Regional Spectrum Management Centers become operational, but at the present time only the prototype Chicago Center (see Jan. 1972 D.C.) is under way and funds for the other centers still await Congressional approval.

It is in the area of AM station inspection that the report finds the Commission's activities most poorly directed. Noting that the present plan of attempting annual inspections of each AM station has produced little in the way of solid results, the report urges the Commission to drastically reduce the frequency of AM station inspection. Other recommendations of the report urge the Commission to turn operator exams (except code tests) over to the Civil Service Commission (CSC), and ship radio inspections over to the Coast Guard.

The combination of recommendations for more concentration on UHF and VHF monitoring activity and reduced surveillance of AM stations has already produced on typically bureaucratic result: the next time your friendly RI comes around, he may not check your tower lights, but if you have a remote-pickup license, he will be sure to ask to see the logs for it.

Will the AM Freeze Finally Be Lifted?

The Commission's staff is laboring to complete the draft of a Report and Order lifting the "freeze" on new and improved AM stations. Present target date for Commission consideration is near the end of 1972.

Although it is impossible to predict the Commission's reaction to the staff's latest proposal, Chairman Burch is known to be anxious to dispose of long-pending cases. The new proposal is expected to emphasize the availability of a choice of high-quality services to as many listeners as possible, under a formula which should provide for a substantial number of new stations. Ethnic overtones which characterized previous proposals are lacking.

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(Continued from page 4)

Rules Adopted for "Class I" TV Devices

The Commission has made final proposed rules governing the operation of so-called "Class I" TV devices. These are devices which produce a video-modulated RF signal on a TV channel for connection to a standard television receiver.

A number of such gadgets have appeared on the market in recent months, but they have been manufactured under waivers of the rules (see October 1971 D.C.). When tests by the Commission's Laboratories showed their performance to be satisfactory, permanent rules were adopted.

The Commission postponed action on a request for a wireless surveillance camera (see December 1972 D.C.), and turned down a separate request for a wireless TV signal distribution system to be used to demonstrate receivers on dealer's floors.

"Non-duplication" Condition Imposed on TV Translators

Overruling the objections of a newly-established low-power Montana TV station, the Commission has renewed the licenses for two VHF translators serving the city to which the TV station is licensed. In doing so, however, the Commission required the translators to provide same-day non-duplication protection to the programs of the TV station. The TV station is a "cherry-picker", and the Commission concluded that the continued operation of the translators was desirable to "assure the public of the availability of a wide choice of programs.

Short Circuits

Efforts to agree on standards for the use of inexpensive, narrow video tape by CATV systems are being encouraged by members of Congress, who now have difficulties reaching their constituents because of the present jungle of conflicting standards...A South Carolina television station has proposed that the Commission raise the limit on VHF translator power east of the Mississippi River from one watt to ten watts in mountainous areas...The Commission has turned down a request for the assignment of "a" VHF TV channel to Los Angeles for ETV; which channel? Los Angeles now uses Channels 2, 4, 5, 7, 9, 11 and 13 all grouped together on Mt. Wilson...The Commission has proposed to reduce the bandwith of remote-pickup transmissions on 166.25 kHz and 170.15 kHz from 60 kHz to 25 kHz.

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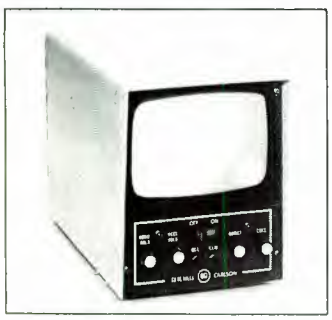

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LETTERS TO THE EDITOR

Station Security Still A Problem

Dear Editor:

I have just read "Stations Seek Equipment Protection" in Letters To The Editor, **BE**, Sept., pg. 10 and "We Were Blown Off The Air", **BE**, Oct., pg. 30. Apparently, burglary and vandalism are becoming serious problems to broadcast installations, especially at remote sites.

Presently, there are commercially available detection systems which define a perimeter. Utilizing state-of-the-art techniques, these systems will detect the crossing of the defined perimeter. Such a system could be installed just inside the fence at a remote site, and an alarm signal could be fed to the studio to indicate a perimeter crossing. It appears to me that the installation of a perimeter protection system could save broadcasters from the possible loss of thousands of dollars.

Benjamin L. Lowe
Consultant Eng.
Garland, Tex.

Magnetized Cart Headache

Dear Editor:

Many of the radio stations are using the Criterion (Gates) delay cartridge. We purchased one a year or so ago, and it worked fine for several months. Then the audio started to deteriorate and there was a hiss in the background, which got louder. I changed the tape, cleaned the cartridge many times, to no avail. I even tore down the cart machine, and found nothing wrong with it.

I stumbled onto the solution. I took out the permanent magnet, then with a large hand eraser I erased the entire cartridge for about two minutes. The case of the cartridge is aluminum, and the flywheels are brass, but the shafts for all the drums and flywheels appear to be steel. Apparently something in the cartridge became magnetized, causing the hiss and distortion. The cartridge now sounds better than it did new, there is no noticeable difference between live and delay.

Fred Clinger
Chief Engineer
WBCO Radio
Bucyrus, Ohio

More On Signetics

Dear Editor:

Having just read Walter Jung's article, "A New IC Approach to Audio Power," in the October issue of BE, we have decided we would like to experiment with the Signetics NE540L IC; however, we have been unable to find an address for ordering these units.

W. B. Wilson
Engineer
KWIX Radio
Moberly, Mo.

The Signetics Corporation address is: 811 East Arques Avenue, Sunnyvale, Calif. 94086.

Let's Salute WLTL And Staff!

Dear Editor:

Many students at Loyns Township High School feel that radio is nothing more than something to fall back on when television is not available. They also feel that the school's ten watt noncommercial FM station, WLTL, is somewhat of a farce. We at WLTL are trying to change the students attitude toward radio in general and WLTL in particular. True most of the students involved with the station are not really interested in making

broadcasting their career, but there is a small percentage who are.

And it will be this small percentage, who will make it in broadcasting. It is this group who will one day be controlling that regional AM station, or behind that new network. These young broadcasters are already like all broadcasters, to them broadcasting isn't a game, but an **art.**

Low power is no excuse for poor programming and WLTL or any ten watt class D station for that matter doesn't use it as one. As for professionalism, it is not unusual for the chief engineer of a school station to have his 1st Phone at 16 years of age. And you better believe he didn't get it at one those six week schools but earned it through his own hard study. At that stage of the game it isn't playing any more.

And all these young broadcasters ask is a **chance.** Most of the stations equipment is donated by very generous local broadcasters. And once the novelty wears off the school suddenly finds it very difficult to raise money for the station. The new "toy" has lost its gloss.

What's left . . . grants from large corporations, what's good enough for PBS is good enough for WLTL. Although getting grants for a ten watt station is difficult.

WLTL now has plans to start stereo broadcasts. We will need more equipment and, of course, money. Many people say it's impossible. It seems to me people were once saying it was impossible to start a station.

James White
Chief Engineer
WLTL-FM
Western Springs, Ill.

"COME HELL OR HIGHWATER, ARTHUR KEEPS HIS STATION ON THE AIR."

INDUSTRY NEWS

The Yuletide Spirit
Saint Nick Speaks Up

Nicholas Johnson, outspoken Federal Communications Commissioner, told broadcasters that they must lead in the fight to preserve free expression.

Addressing a Fall Conference sponsored by the National Association of Broadcasters, Johnson warned against "government by television" and told the radio and TV executives in attendance:

- President Nixon's Office of Telecommunications Policy "has come to stand for the Office of Television Politics . . . a not-very-subtle part of the Nixon Administration's program for controlling the media image of the President."
- Mr. Nixon and Vice President Agnew "viciously attack their only effective critics—the network newsmen—and . . . the same heavy hand could come down on your station tomorrow."
- The President "has been waging a vendetta against the Puny (Public) Broadcasting System—vetoing its funds, attacking its newsmen, (and) finally appointing a former Director of the Voice of America to head the organization."

The FCC Commissioner, who often has been critical of broadcasting, said Americans depend on radio and television for "information and education about a great many issues of our time" and the industry must use its First Amendment rights of free speech to explain those rights to the public.

"You have to explain them to your audience if you expect them to support you in a showdown with the President," he said. "For the day may be coming when the full artillery of the White House may make your early skirmishes with the FCC look like a school boy's fight with sling shots."

Recalling that H.G. Wells, author of such books as **War of the Worlds,** once wrote that "Human history becomes more and more a race between education and catastrophe," Johnson told the broadcasters:

"It is you who provide that education for our nation; you who will bear some measure of the responsibility for whatever catastrophe may befall us in our ignorance. Now, more than ever, America needs your independence, courage, and leadership."

He said "First Amendment" and "freedom" are words that "we sometimes throw around very carelessly" and only take on real meaning when "used in defense of unpopular ideas" or to resist challenges successfully.

He chided broadcasters for failing to do more. While it was "well and good to run full-page ads" to interest newspapers in broadcasting's problems, he said, the industry could have spoken out on FCC station fines for alleged obscenities, about efforts to censor song lyrics on records, and subpoenas of newsmen's records, cuts in PBS funds, etc.

The Commissioner, whose term expires next June, described himself as "the senior minority member of the FCC . . . confronting retirement at the age of 38." He thanked the broadcasters for giving him "a chance to say goodbye."

"Actually," he quipped, "my departure ultimately may come to be viewed by the broadcasters as a mixed blessing. After all, you won't have Nick Johnson to kick around Richard Nixon anymore."

Wasilewski Trips Johnson

Vincent T. Wasilewski, president of the National Association of Broadcasters, said that statements made by Commissioner Nicholas Johnson of the Federal Communications Commission regarding the advertising on radio and television of over-the-counter medicines "are simply not supported by the facts."

At a meeting on drug advertising sponsored by the National Council of Churches in Washington, Commissioner Johnson stated that "television is the principal pusher to a junkie nation" and advocated a complete ban on broadcast advertising of over-the-counter medicines.

In reply, Mr. Wasilewski said: "Mr. Johnson's statement is an unreasoned one. His statements are simply not supported by the facts. No research has established a relationship between drug addiction and the advertising of proprietary remedies. In fact, the weight of the evidence is that there is no such relationship.

"The only products advertised on radio and TV are common, nonprescription remedies and medicines that are legally sold over the counter in hundreds of thousands of drugstores and supermarkets across the nation and have been for decades. To claim seriously that the advertising of aspirin and pain relievers, cough medicines, sleep aids, nasal sprays, mouthwashes, and such products are a principal cause of drug addiction is to mislead the public and divert attention and resources from the real causes.

"In fairness, we urge Commissioner Johnson to recognize the positive contributions the radio and TV industries have made in carefully policing and restricting advertising of proprietary medicines under the rules established by the Radio and TV Code Authority."

Send Your Industry News to Broadcast Engineering 1014 Wyandotte Kansas City, Mo. 64105

NAEB Funding Program

A five-year funding proposal for "the next growth period" of public broadcasting in this country was advanced by Educational Television Stations, the television arm of the National Association of Educational Broadcasters.

Three basic funding components are involved in the plan, authored by ETS Executive Director Presley D. Holmes: (1) A **Corporation for Public Broadcasting Basic Support Fund,** federally underwritten, at an approximate five-year total of $100 million, with a maximum of $30 million in any one year. Such a guaranteed total over a five-year period would allow CPB flexibility in management and future planning. For instance, it would permit financing projects requiring large initial outlays to cover start-up costs.

"Discrete predictable federal funding, not private support, is necessary for basic CPB support," the ETS statement notes. "... so that CPB may perform its necessary national role of leadership, study of future directions including new technology, provide station development support such as incentive/upgrading grants, loan funds, services for new licensees ..., experimental and innovative programs, research, planning and evaluation. CPB's role is future oriented, not day-to-day operation."

(2) A **Station Operational Support Fund,** underwritten through non-federal revenues matched by federal funds equal to not less than one-half of the non-federal dollars reported by public broadcasters, computed annually for the next five years. Monies would be allocated to separate radio and television funds in proportion to matching federal contributions, e.g., if $168 million in non-federal support was reported, $144 million from television and $24 million from radio, then the federal appropriation to the television fund would be $72 million and to the radio fund $12 million, at the minimum matching ratio. The proposal suggests that the ratio be gradually increased throughout the five-year period.

One-half of the operation support fund should be distributed to the stations for local budgetary control, the proposal suggests, and one-half reserved primarily for national program acquisition, production and delivery, allocated to a Program Bank administered by CPB with expenditures authorized by the stations.

While the Program Bank concept has certain similarities to the program distribution plan conceived by Public Broadcasting Service President Hartford N. Gunn, Jr., the statement points out, there are also significant differences: the proposal does not envision a cooperative; Program Bank funds do not become part of a local station's budget and thereby risk the prospect of reducing non-federal income; and the proposal assures that certain national services are guaranteed at minimum levels to allow proper lead time and long term planning.

(3) A **Station Facilities Support Fund,** to increase federal support for the acquisition and improvement of broadcast facilities through the Educational Broadcasting Facilities Program in the U. S. Office of Education. For expansion and improvement, the proposal recommends, Congress should appropriate no less than $200,000 for each television licensee in each of the next five years—or approximately $32-42 million annually. For activation of new television transmitters, some $6 million for each of the next five years should be appropriated.

Copies of the complete proposal are available from NAEB's Office of Information Services.

SOCIETY OF BROADCAST ENGINEERS, INC
P O Box 88123 Indianapolis, Indiana 46208

SBE Revives its open forum pages

Dear S.B.E. Member:

It is with pleasure that I address you via these pages which represent the beginning of our new association between the Society of Broadcast Engineers, Inc. and Broadcast Engineering Magazine. Over the years of its existance, BE has demonstrated its interest in and responsibilities toward the broadcast engineering profession. They have encouraged and helped our Society in many ways.

Not the least of BE's impact is that each time S.B.E. is mentioned we receive a flurry of new membership applications. It is obvious that BE is reaching the right demographics for our purposes and, no doubt, the right ones for those who use BE to bring their products before the broadcasting profession.

BE has willingly agreed to permit S.B.E. to publish a special section in each issue for our purposes and under our banner.

Each issue will feature local chapter news with special emphasis on photographic reporting. (Send in photos of your activities!) As a Society member, you are also invited to submit papers to Editor Joe Risse for Board approval.

I invite all readers who might be interested in joining S.B.E.'s growing ranks to use the membership application form or write the national office for information regarding membership qualifications.

I also encourage you to seek out the youngsters who are interested in radio and television. From these ranks will come the next generation of broadcast engineers who need and deserve your active help.

With this new association it seems appropriate to announce another new beginning. Chapter 30, South Bend/Elkhart (Indiana) is the latest addition to S.B.E. local chapters. Organization night was held October 19, 1972, at the studios of WSJV with Chief Engineer Lou Swift and Ass't. C. E. Mark Carey hosting the organization meeting.

Interest in forming a new chapter was sparked by Chapter 25's (Indiana) chairman Bob Wyckoff and secretary/treasurer Odes Robinson, Jr. New Chapter 30 chairman Chris Frederick ably assisted in getting twenty-one men to the original meeting. The pros and cons of a local chapter vs. attendance in Indianapolis were the main points covered at the meeting, followed by the election of officers. Those responsible for guiding Chapter 30 during its first year are: Chairman Chris Frederick, WJVA; Vice Chairman Louis Swift, WSJV; and Secretary/Treasurer Mark Carey, WSJV.

National Society president Bob Flanders countersigned nine new S.B.E. applications at the meeting.

All broadcast engineers in the general area are invited to attend future meetings. Call Chairman Frederick for time and place. Local chapters are the lifeblood of the Society of Broadcast

(Continued on page 15)

SOCIETY OF BROADCAST ENGINEERS, INC
P O Box 88123 Indianapolis, Indiana 46208

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EMPLOYMENT RECORD: most recent first	Station or kind of business	Time Employed From	To	Position or Duties
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Trade or Mechanical					
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Two references familiar with your work:

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Be Sure To Sign

Enclose $10.00 (or $5.00 for bona fide students). No action taken without Dues.

Signed _____ Date _____ 19 ___

I agree to abide by the Constitution and By-Laws of the Society if admitted.

ADMISSIONS COMMITTEE ACTION: Date _____ Approved for Grade _____

Action Deferred for More Information _____ Candidate Notified _____

Chairman's Signature _____ Entered in Records _____

Engineers, Inc. It is in these meetings that each can share his experiences and knowledge with others. To these meetings you can attract the veteran as well as the novice, and in turn, the sum total number of members will attract many talented speakers to bring to all new and pertinent updating on the state of today's art. And don't overlook the fraternal side of the meetings.

The Society of Broadcast Engineers, Inc. is actively encouraging the formation of new chapters. If there is no chapter in your area, one should be formed. The national office is ready to help you. Please call or write if you are ready for the challenge of a new chapter.

Cordially,

Robert W. Flanders

Robert W. Flanders, Pres.
Society of Broadcast Engineers, Inc.

Chapter news roundup

The SBE welcomes our newest chapter, Chapter 30 from Indiana. Shown here at the organizational meeting at WSJV are left to right, first row: Chris Thornton (WSBT), Ray Jackson (WNDU), Russ Summerville (WNDU), Robert Cox (Indiana Tech). Second row: Jack Gilliam (WSBT), Chris Frederick (WJVA-WRBR), Gary Gutt (WSND), Eric Culp (WCMR-WXAX). Back row: two names we missed (sorry fellas), and Roger Tinti (WSJV), Dale Wynn (WSJV), and Bill Ryan (WMEE).

Reports of SBE chapter meetings and announcements of future events will be published in these pages monthly. It is important that chapter secretaries send information on meetings and other news as promptly as possible. Include photographs whenever available; preferred photo size is 8 x 10 but smaller sizes are also usable.

The monthly deadline for submitting copy is the 25th of the 2nd month preceding the month of publication. For example, the date by which copy must be in the hands of the SBE editor for the March 1973 issue is January 25th; for publication in the April issue, the date is February 25th, and so on. Letters to the Editor are welcome. Send all material for publication to: SBE Editor, P.O. Box 131, Dunmore, Pa. 18512.

Chapter News

Chapter 1—Binghamton, N. Y.
Chairman: Larry Taylor.
WENY TV, Mark Twain Hotel, Elmira, N. Y. 14901

Although the serious flood of June had dampened the spirits of engineering people at many of this chapter's stations, chairman Larry Taylor of WENY—TV has continued to promote lively and interesting monthly meetings through his very motivating meetings announcements. The latest meeting was Tuesday, November 14, at the Celeste Restaurant, Binghamton; dinner was followed by a tour of WSKG and WICZ—TV. Don Kilbrith of International Video Corporation hosted the refreshment hour. Good news was that Wiley Bates, who had suffered a heart attack recently, was coming along nicely. A recent objective of the chapter, to welcome attendance by CATV people, has begun to bear fruit.

The preceding meeting, October 10th, was a general discussion

meeting. Interesting ideas and comments were exchanged with virtually everyone getting in on the act. In September, Jerry Preston, of RCA Broadcast Products, provided an educationally-interesting session on AM Ampli-phase transmitters, a type now widely used.

Chapter 2—Northeastern Pennsylvania
Chairman: Charles Morgan, Chief Engineer, WARM, Avoca, Pa. 18641

The November 13th meeting was a seminar conducted by Tony Hawkins of Revox Corporation. Hawkins conducted a 2-part discussion and demonstration.

Part 1 related to principles and features of microphones for particular applications; part 2 concerned servo-controlled motors for professional tape recorders, especially for precise speed control and tape handling.

An important project of the chapter in recent months has been to increase attendance at meetings, especially by students, teachers, distributors, and others not necessarily members of the SBE. Some success was evident from observing the list of those attending the October meeting; the nonmembers outnumbered the members. The project will continue.

The October meeting featured Jerry Preston RCA Broadcast Products, who talked on the Ampliphase concept of AM transmitter design, which differs drastically from convention transmitter design. Preston, very knowledgeable of the features of this type of transmitter, handled with skill some of the difficult questions posed by local station engineers who had installed this type of equipment since the catostrophic flood of several months ago which had wiped out the transmitters of several area stations. The applause that followed was well-deserved by Preston.

Chapter 16—Seattle, Washington
Chairman: Clay Freinwald, KMO Radio, Box 1277, Tacoma, Wash. 98401

The Seattle chapter is one of the few that continues to meet right through the summer months. Recent copies of their news letters, very capably edited by Nick Foster, report meeting dates of June 14, July 12, August 9, September 13, October 4, November 8. Also worth noting about the Seattle meetings is that they are normally held at noon, with a social hour starting at 11:30 AM, lunch at 12:00 noon, followed by a guest speaker who covers a technical topic of wide interest. The meetings are nearly always held at the Black Angus Restaurant, Elliott Avenue West, and everyone interested is welcome.

Chapter activities and other news of interest to members are reported in a newsletter which runs 2 to 4 pages each month. Various technical information ranging from FCC activities, to education and training in the broadcast field, and integrated circuits, is interestingly covered by Editor Foster.

Chapter 17—Minneapolis-St. Paul, Minn.
Chairman: Lance J. Raygor, CCTV University of Minnesota, Minneapolis, Minn. 55413

On November 8th, Roger Czerniak, distribution sales manager, and Cliff Olund manufacturing engineer manager, Nortronics Inc., talked on tape head construction. Door prizes included Nortronics alignment tapes and splicing blocks. On October 18th, the meeting was held at KSJM-FM where Mike Shiels gave a talk on Grounding Procedures. This was followed by tour of the station facilities many of which were a result of the initiation or design by Mike who had previously done other design and consulting work in the broadcast field.

The meeting for September was held on the 17th; it was a talk by Don Malley, chief engineer, and Lewis Munn, Technical director, of KTIS, Mid America Inspirational Network, followed by a tour of the facilities and the school's library and chapel. Coffee and cookies were served in the dining area.

The September meeting was the first one following summer recess; the previous meeting was in June when Lee Mahrer reported on the FCC's reply to the chapter's comments on the NAB proposal to relax broadcast operator requirements. At the same June meeting, Dave Stroberg talked on vertical interval switchers and special effects generators.

Chapter 18—Philadelphia, Pa.
Chairman: Jack Jones, WCAU TV, Philadelphia, Pa. 19131

The most recent meeting of this chapter was November 27th. A refreshment hour preceded dinner, after which R. C. Rogers of Phillips Broadcast Equipment Corporation presented a demonstration of his company's professional audio tape recorder and playback systems. The Philadelphia chapter's meetings are usually held at the Williamson Restaurant, Dolly Madison Room, Schuylkill Expressway & City Line Ave.

During October, two meetings took place. On the 23rd, dinner at Williamson's was followed by the technical session at the WCAU-TV Studio I where William Raventos of Electro-Voice discussed and demonstrated professional grade microphones. He covered product conception, design, field testing, room and studio acoustics, and the design of sound systems.

(Continued on page 42)

The Gates TE-201 . . .

A 40 lb. color camera that's uncomplicated and economical.

The Gates TE-201 is a unique combination of long-term operational stability, superior low light level lag performance, and complete broadcast quality in a small, lightweight color camera that can be used in a wide variety of broadcast applications.

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Thermometer installation and calibration

Most stations have some means of telling what the local temperature is, but many of these stations are not giving the correct temperature. This article explains the problems and tells how to correct it.

By Pat Finnegan*

From the earliest days of broadcasting, stations have been making temperature announcements. Going outside to read a thermometer in those early days was most inconvenient. As remote reading thermometers became available, broadcasters put them to use, but not always correctly.

Thermistors have been around for a good many years, but since they have gone solid state, they have become the predominant sensing element for electronic thermometers. Quartz also has made the scene, but it is far more expensive than the thermistor. In this article, we will discuss units using the thermistor, their correct installation and calibration.

*BE Maintenance Editor

What Temperature Is Correct?

Most people tend to think in terms of absolute values when it comes to temperature. The air temperature over a large area can vary several degrees due to environmental conditions at particular thermometer locations. Then too, the various materials used as the sensor in thermometers have their own peculiarities. Thus, the discrepancies noted on various public thermometers about town can be due to actual temperature difference of the air surrounding the sensor, an inaccurate instrument of both. The public becomes more temperature conscious at extremes, such as readings below zero and those around 100 degrees. At season changes, concern grows when temperatures near the freezing mark and frost possibilities exist. This makes your temperature announcement a very real public service.

How They Work

A thermistor is a special temperature sensitive, solid state resistor. The internal resistance will change linearly with changes in the air surrounding the element. The thermistor, as an air temperature sensing unit, is mounted in a small metal housing that is intended for outdoor mounting. The metal housing is about the size of a small birdhouse and is designed to allow free circulation of air around the sensor, but at the same time protect it from direct exposure to rain, ice, snow, and direct radiation from the sun.

The sensor unit is connected by a two to four conductor cable to some readout device inside the studio building. The number of wires in the cable depends upon the individual model and system. Ordinarily, cable length can be up to 200 feet, but much longer cables can be used. When a very long cable is used, for example, 1000 feet, that cable should be attached to the sensor and both calibrated together. The resistance of the long cable then becomes significant.

The thermistor must have power, so a power source (a battery or an AC to DC convertor) is mounted in the studio. There may be a zener diode to regulate the voltage, a calibrating resistor to set it to correct value, and a resistor voltage dividing network. In most of these, the calibrating resistor sets the voltage to the sensor, rather than varying the resistance of the return circuit.

With power supplied to the sensor, DC current will flow through the circuit and be returned to the studio. The value of this current will be dependent upon the internal resistance of the sensor at that instant, and the internal sensor resistance will depend upon the ambient air temperature surrounding it. This small DC current is then read on a microammeter, whose scale is marked in temperature degrees. There are many of these simple remote meters in use today, with the meter mounted in the studio or control room, so that temperature readings can be observed conveniently and aired.

Complex Systems

There are also more complex systems available and in use. Such a system may give a visual readout on seven segment numeric displays, and also cue up a cartridge tape so that a taped voice temperature announcement can be made over the air.

The sensor and cabling requirements in the complex system are essentially the same as in a simple system, but the power for the sensor is taken out of a well regulated power supply. The current changes from the sensor are first amplified at the studio control unit and applied to modulate an oscillator—that is, shift its fre-

Outdoor weather housing for weather instruments in use at WLBC in Muncie, Ind. Sensor for electronic thermometer is housed here also. All cables run through an underground conduit.

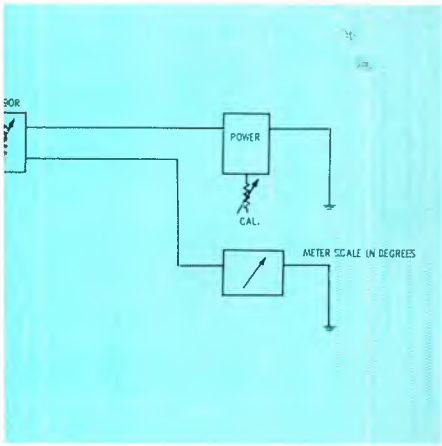

Fig. 1 Block diagram of a simple remote reading thermometer.

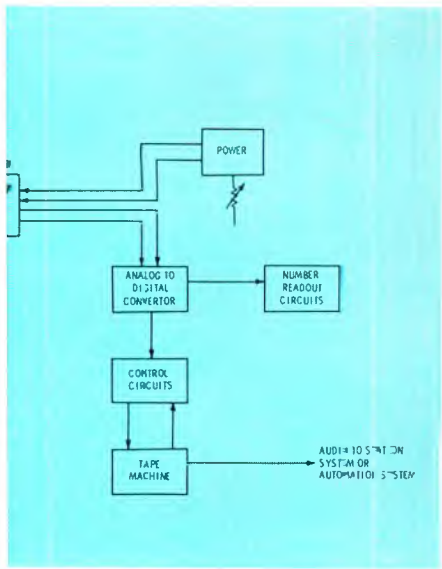

Fig. 2 Block diagram for a more complex thermometer.

quency. What is taking place is a conversion from analog information to digital information. The digital information is processed and fed to numeric readouts for a visual display of the temperature. At the same time, the digital information, which has a direct relationship to the changes at the sensor, causes a tape cartridge to cue up to the correct announcement.

The tape cartridge contains no special encoded or digital information on it. It is a regular cartridge, made up of voice temperature announcements. At the end of each announcement is the normal 150 Hz auxiliary tone, and then the normal cue tone. The counter in the unit electronics counts these auxiliary tones as they go by. But rather than one large cartridge with all the announcements on it, the possible announcements are divided into several groups, each group on one cartridge. In this manner, the extra time that a large cartridge would take to cue up is saved.

Installation Considerations

The reliability and accuracy of the sensor is very dependent upon how and where it is located. It should be as far away from the studio building as is practical. It can be mounted in its own metal housing on a pole, or the entire housing can be mounted in a larger Weather Bureau approved structure. The important consideration is free air circulation around the unit.

Many buildings are of such design that they trap pockets of air. The air in these pockets can be very different from that of the moving air. Also, avoid locating sensors near building exhaust fans or those from air conditioners, as these can heat the local air above the prevailing outside air temperature.

Avoid mounting the sensor at the tower base or on a power pole. The sensor is sensitive to lightning discharges, and even large static drain discharges can damage the sensitive unit. If it is damaged, the thermistor will be erratic or it may simply become non-linear. In either case, the temperature readings will not be correct.

System Maintenance

Because the sensor is susceptible to lightning damage, it will pay you to buy a good, calibrated mercury thermometer. Mount this alongside the thermistor sensor in the weather housing. You can't do this if the thermistor is mounted in its own housing by itself outdoors. Use the mercury thermometer as the standard and calibrate the thermistor unit to the reading on the mercury, if there is a difference. From time to time, you should check the mercury in the box against the readout in the studio. Any non-linearity of the thermistor will most likely show up at the ends, that is, low or high temperatures.

Some companies may have three stations located at the same site. In this case, there may also be more than one remote thermometer, and it is very likely that there will be three different temperature readings. This can be embarrassing if all three stations are announcing a different temperature at the same time.

If possible, have only one thermometer and run remote meters or readouts to these different studio locations. (Right or wrong, at least all three stations will give the same temperature.) This single sensor should be calibrated against the mercury. If it is necessary to have separate units, at least try to mount all the sensors in the same weather housing, and calibrate all of them to the mercury reading. When the sensors must be located in different places, it is possible that all are

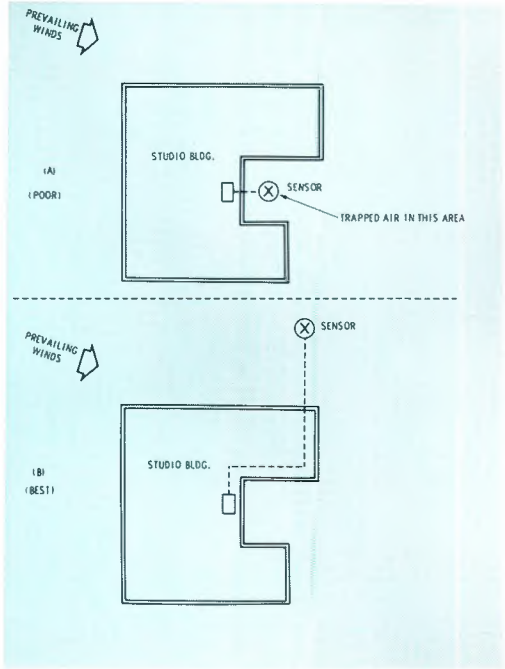

Fig. 3. (A) Some building designs can trap pockets of air. Sensor mounted in such a pocket will give incorrect readings. In **(B)** we see a better installation, because the sensor is mounted away from the building and where air can circulate freely.

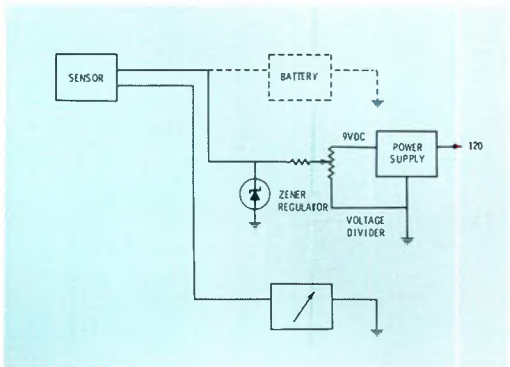

Fig. 4 On the simple system that uses only a battery for supply voltage, you can eliminate the bother of battery replacement. It can be replaced by an AC to DC power supply. If voltage is higher than required, add a resistor divider and a zener diode for regulation.

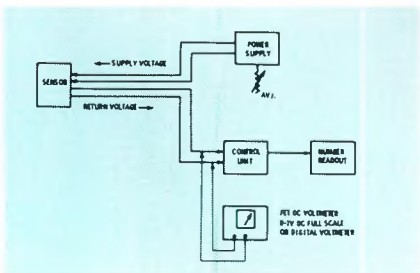

Fig. 5 Checking accuracy and calibration of sensor and system electronics on the complex system: Use a FET or digital voltmeter to measure voltage returned from sensor. Adjust power supply voltage to simulate temperature changes.

reading correct temperatures—even though different. One site may be getting warmed up from transmitter exhaust blowers. You can still calibrate all of them to the one reading from the mercury standard.

Calibration Control

If your simple system has no calibrating control on it, you can still add one. Add it to the supply voltage so you can adjust the voltage the sensor gets. Don't try to vary the sensor resistance itself. If the power supply is only a battery, you can substitute one of the small AC to DC convertors. Make sure it is the same voltage as the battery or higher. If it is higher, build a resistor voltage divider, and perhaps add a zener diode for better regulation.

From time to time, check the small metal sensor cage. This may acquire a number of insects and spiders who build nests in it. Too many inhabitants can cut down the free air flow around the sensor.

You can check for accuracy and linearity of the sensor, if you have the information on the unit supplied by the manufacturer. In the manual for one complex system, I found a listing given for all the voltages the sensor will return for each degree from −61 to +120 degrees. These voltages are very small and are given to 4 decimal places. You need a digital voltmeter or an FET meter to read such low voltages. They range from 0.1 to about 0.75 Volt. The FET meter usually has a range for 1 Volt full scale. Even with this, it is not possible to read to 4 decimal places. It is still possible to come up with a reasonably good conclusion of the electronic system accuracy and the sensor accuracy.

To do this, consult the chart and find a reading in the low, low range that comes out almost an even figure, such as 0.1001. Note what the chart says the temperature readout should be for this voltage. You can simulate temperature changes by adjusting the supply voltage to the sensor. You attach the FET meter across the sensor return voltages. Adjust the supply voltage until the meter reads the voltage selected from the chart. Now check the readout. It should show that temperature according to the chart.

Next, try one on the high end, such as 0.7000. Adjust the voltage and check the readout. Now try one in the middle. If for these given voltages from the sensor the readouts show the correct readings, the electronics control section is calibrated correctly. This depends now, on how close you were able to read those voltages and set the supply voltage. If you are lucky, the present outside temperature is one that gives you an easy voltage reading. Check this one out also. Now reset the power supply to the correct voltage (this must be set accurately). The readout should give the correct temperature as it did earlier. You can still check the return voltage with your meter. If the readout and the return voltage are much different than the test readings, you need to replace the thermistor.

Cartridge Alert

Operating the complex system, it is important that the correct cartridge for the range of expected temperatures is in the machine, and that the switch on the unit is set for the lowest temperature on the cartridge. If the temperature outside is out of range of the cartridge, it will continue to run because it can't find the correct announcement, and this will eventually cause the tape to wear out or something break down. Besides that, you can't get an announcement on the air in an automation system. If the switch is set so that it does stop, it will be the wrong announcement and this can be far from correct. To air such an announcement would negate the whole reason for having the unit in the first place. □

TCB-19/25

What is it costing you to service your old color monitors? We'll give you $1,000 off to try the new Miratel TCB Series. This is your chance to prove these are the most dependable color monitors currently available.

Ship us any old color monitor, working or not. It's worth $1,000 off on a trade for a new 14, 19 or 25-inch TCB Series monitor from Miratel. We're making this offer because we want you to try our new solid-state monitors. We want you to see for yourself why the TCB Series is setting new standards for purity, stability and trouble-free operation. This special offer is good until March 31, 1973. Act now, and you can put a Miratel monitor in the rack for little more than the cost of a receiver-type monitor.

Both NTSC and RGB models are available. The NTSC models include switchable long or short time constant AFC, making them particularly useful for VTR alignment. TCB Series models also have front panel selection of two video inputs. Critical set-up and adjustment controls are front mounted for convenience. Packaging options include cabinet, rack mount or custom.

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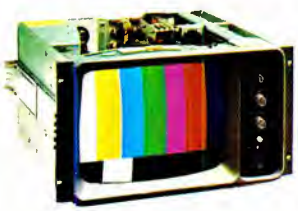

TCB-14

(Offer limited per customer. Allowance on list price only.)

TCB-19

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For More Details Circle (13) on Reply Card

Monitoring and reporting the weather

By Clint Tinsley*

In this day of competitive radio and more listener concern in the services that a station offers, it is becoming apparent that we need to do more than hang a thermometer out the window in reporting the weather. Not saying that "time and temperature" checks are not good and possibly supply revenue when sponsored but we need to do more.

*CE, Meridian, Idaho.

Small/Medium Market Stations

In my experiences, both as an operator/announcer and as engineer, I have found that most stations rely on some type of outdoor thermometer (usually being of the hang-it-outside-the-window variety available from local hardware stores or businessmen who have them imprinted with their business

Outside wind speed and direction unit at left sends signal to control room wind speed and direction indicator.
(Photo courtesy of Texas Electronics)

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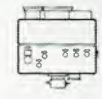
tube type		useful output power* Band I (kW)	Band III (kW)	cavity type [1]	
YL1520		20	25	40768	
YL1430		12.5	17.5	40747	
YL1420		6.25	8.5	40745	
YL1440		1.5	1.5	40743	

Peak sync power in C.C.I.R. system with B(-1dB) = 7 MHz
[1] Only cavities Band III vision shown from total range.

PHILIPS Electronic Components and Materials

PHILIPS

Weather Stat Sheet

Yesterday Hi.....____
High Today.....____
Low Today.....____
Baro. Pres.....____
Winds.....____

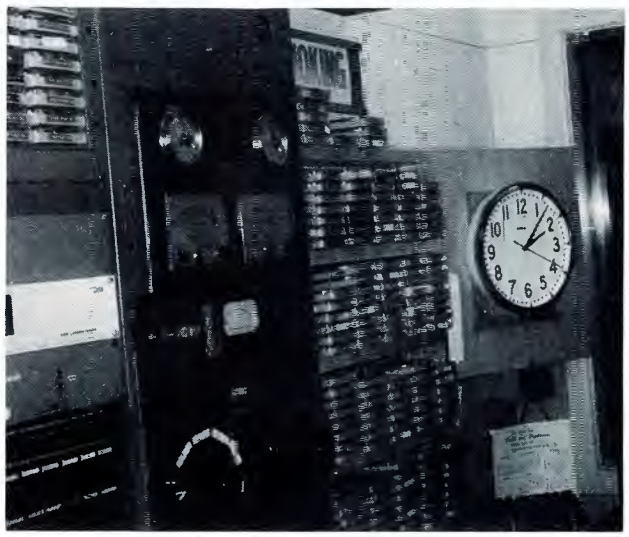
Misc.....____
____
Forecast:...____
____
____
____

Fig. 1 Weather "stats" form.

Fig. 2 Here the DJ can easily view the wind speed and direction indicator. It's directly under the lamp.

Fig. 3 Behind the DJ, and atop the tape recorder, a piece of weather equipment is continuously logging temperature changes.

Fig. 4 In this arrangement you see a more complete unit with various readouts for monitoring the weather.



logo and distribute them as a form of advertising.) This thermometer is usually located outside the control room/studio window, unless construction is such that the control room or studio is without outside windows. In that case, one of the many types of remote reading (thermistor or "bulb capillary" type can be used, again with the reading device located in the control room/studio. (See Finnegan's article in this issue.)

Some stations utilize the aeronautical weather reporting service via telephone line. This is generally a recording which is telephone accessed and can be handled in one of two ways: 1) Recorded at the station for direct playback on the air, and 2) a form is used similar to Figure 1 in which the weather "stats" are listed and then the announcer adlibs around them, which does add a degree of aliveness to the program.

My only reservation in this type of reporting is that due to the time lag in the recording, the

current/immediate weather conditions may not be reported accurately.

In facility weather monitoring has particular advantages to all stations, in particular, actual weather conditions in the station's immediate local as well as providing that competitive edge in your market by providing more services to the listener.

In surveying this weather reporting facility question, it might be appropriate to look at two such facilities.

KBRJ-Boise

KBRJ is a 5000 Watt AM daytimer Country and Western station. This station is unique in that the control room is much like an air traffic control tower located atop the station building and glassed in on all sides. The operating position with the wind speed and direction indicator located directly in front of the operator. A recording thermometer which records outside temperature from a bulb sensor and a recording barograph are also used. The recording instruments provide an added dimension in that actual changes are apparent and can be reported as such. The instruments at KBRJ as well as the installation are manufactured and supplied by TAYLOR of Arden, N.C.

KBOI-Boise

One of the stations I surveyed while writing this article was KBOI-AM-FM-TV, which is a television and FM outlet and is licensed as a 50,000 Watt AM station. It's the best equipped station for weather reporting that I've seen. Primarily, I was interested in the radio control room weather reporting facility. In the KBOI radio control, a TAYLOR "Weatherscope" is mounted in the equipment rack to the upper left of the operator position. Contained in the "Weatherscope" are four separate indicators for barometric pressure, outside temperature, wind direction and wind speed. KBOI also utilizes the weather wire of the National Weather Service. Keep in mind that they are also a television station.

Metrological Equipment Suppliers

Two suppliers of metrological equipment were contacted in writing this article. TAYLOR is primarily domestic consumer oriented while Texas Electronics, Inc., is more oriented to the industrial consumer with a wide range of professional metrological instruments of particular interest to television stations.

Current cost figures for the installations discussed in this article are for the KBRJ facility $304.50 and for the KBOI facility $269.50.

Addresses and phone numbers by which catalogs and ordering information can be obtained are as follows.

Texas Electronics, Inc.
P.O. Box 7225—Inwood Station
Dallas, Texas 75209
Ph. 214-631-2490

Taylor
Consumer Products Division
Sybron Corporation
Arden, N.C.
Ph. 704-684-8111

It is hoped that this article provides some assistance to the engineer in formulating suggestions to management concerning weather reporting at your station.

Appendix I

Cost breakdowns for the two installations are as follows:

KBRJ (Taylor Model Numbers are specified)

3105 Windscope* Wind Speed and Direction Indicator	$129.50
2354 Weatherhawk* Recording Thermometer	87.50
6450 Weatherhawk * Recording Barometer	87.50
	$304.50

KBOI

3108W Weatherscope* Weather Station	$269.50

*TRADEMARK of TAYLOR Instruments

It should be noted that Texas Electronics, Inc., is competitive with an equivalent recording thermometer and a recording barometer (barograph) such as used at KBRJ available at $87.50 each.

Editor's Note:

The trouble with too many weather instrument installations is that they lose their possibility for accuracy, because buildings can radiate heat. As Tinsley points out, especially with thermometers, they are placed just outside a window so they can be seen easily.

It's nice not to run out into the cold of the night with flashlight in hand to get a temperature reading. But your window unit is not likely to be all that accurate, even though it is convenient.

Obviously, weather is as important to your audience as it is to you. Yet we find few stations really geared up for weather reporting. In fact, some stations have no instruments. The smaller the market the station serves, the greater the need for that station to report the weather. However, just the opposite is the case. Since investments in weather instruments really need not be great, we suggest that each station—regardless of market size—should re-evaluate their weather reporting program. Even if you don't have a weather wire, your instruments can warn you that impending storms are brewing. You can call the nearest weather bureau, check it out, and provide a very real service to your market area. □

An introduction to Security Systems

Far too many broadcast facilities are vulnerable to vandals, burglars, and thieves. This series of articles is intended to alert station management and engineering to several methods of protection.

By R. H. Coddington

According to the FBI, general burglaries increased in numbers by some seventy percent during the five years from 1966 to 1971. Recent reports in the trade press indicate that this lamentable escalation is being directly felt by broadcasters. When thieves develop the audacity to make off with its transmitter while a station is on the air*, it's time for other stations to consider very seriously the implementation of security measures.

The field of commercial electronic security systems is mushrooming, spurred by the same growth in crime that has touched a few unfortunate broadcasters. The old-line security equipment firms have been joined by numerous kitchen-table factories to produce a variety of detection and alarm devices that bewilder the security system dealer and installer. **Security World** magazine has compiled a roster of intrusion alarm device manufacturers that numbers around 150. Some of their products are highly sophisticated, while others retain an essence of reliable, trouble-free simplicity.

The local security system dealer will be happy to install a system in your studios and/or transmitter premises. He may offer one for outright sale or, more likely, he will install and maintain it on a lease basis. The station short on engineering time, perhaps having only a contract engineer, may decide that the latter course would be expedient and satisfactory.

For stations with the technical talent, however, it would be shameful to engage an outside firm to do a job that easily is within the competence of its own staff. The broadcast engineer is very likely to command a better knowledge of electronics than is his security system dealer's counterpart. He may even find that the design and execution of a security system comes as an interesting diversion from the routine, and as a stimulant to his ingenuity. There is no end to the novel ideas that he can conceive to outwit the unwelcome intruder. This article is intended to give him a basic acquaintance with the subject.

The easy way to plan a system would be merely to pore through the catalogs of security equipment sources, order the necessary components, and install them. It would be, that is, if the catalogs—and equipment—were readily available outside of the security field. Reputable security equipment manufacturers, however, justifiably avoid selling to other than bona fide security system dealers and installers.

It may be possible to purchase selected components from a local installing firm, where the dealer can satisfy himself that he is not playing into the hands of someone seeking to discern the workings of security systems for nefarious purposes. But the broadcast engineer can build his own reliable intrusion alarm system so inexpensively that he should be ashamed to buy one. He may even have enough "junk box" parts on hand to do the whole job, dependent to some degree on the type of system desired.

System Types

Professional intrusion alarms traditionally have been divided among two categories: **central station,** and **local.** To these must be added a recent third, which may or may not overlap or work in conjunction with them: the **silent** alarm. These categories are distinguished by the manners and means by which they alert various persons to an intrusion.

The Central Station

In a central station alarm, various intrusion detectors on a customer's premises send signals via a leased line to a central command post operated by the security company. The central facility usually includes a fleet of one or more patrol cars with private security guards, and one of these is dispatched to the site when an alarm is received. The local police also are notified by the central station when an alarm is received, so that they, too, dispatch a car.

Some central station systems can monitor and log **any** opening or closing of a customer's premises. Under this arrangement, it is necessary for the client to provide in advance a schedule of such times. This might be satisfactory for studios and offices, but not for transmitter site. Any unscheduled entry, such as one by an engineer investigating an off-air condition, is sure to bring the guards and police, unless he calls the central station beforehand. In the rush to restore a transmitter to the air, no one cares to take the time necessary to make extraneous calls.

There are variations on the commercial central station system. In some localities, the local police maintain their own alarm room, often providing the terminal equipment there for the sake of uniformity. In this case, the alarm equipment in the protected premises must be compatible with that provided by the police. Too, it must not respond to routine opening and closing, since the police are too busy to log unnecessary details.

Another variation of the central station arrangement places the receiving equipment at a 24-hour answering service where, for a nominal rate, the operators will

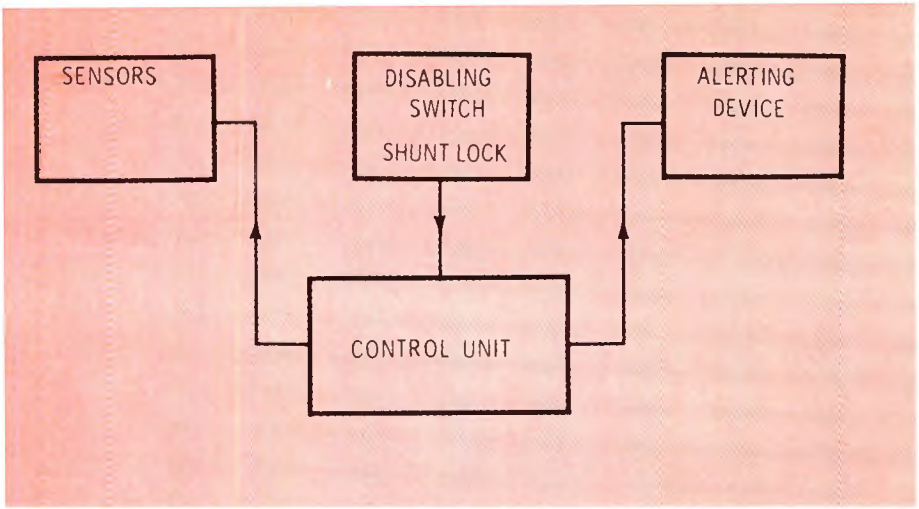


Fig. 1 A complete system requires intrusion sensors and a control unit which interfaces sensors and a signaling device. And the system must include a disabling switch.

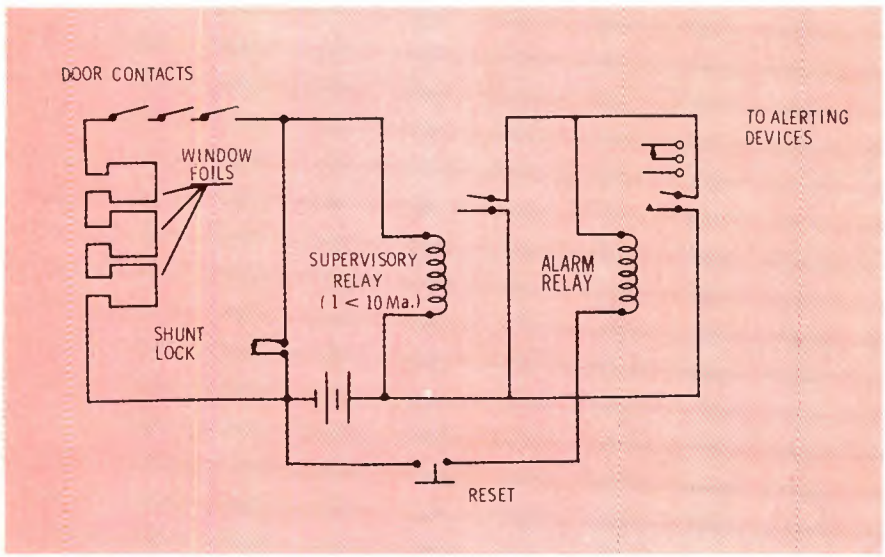


Fig. 2 One of the most popular and reliable commercial units uses a circuit similar to this one.

report any alarm immediately to the police and to any designated station personnel.

All of these methods require a telephone loop from the protected premises to the central location. The commercial security company may, by using coded alarm transmitters, serve several clients per line, but this is unlikely in the case of a transmitter site far from the business district. For the police station or answering service type, the client pays the full line cost, which may carry a lower tariff rate than do audio lines.

Another line to the transmitter may be undesirable, but it does offer one advantage to consider: it usually is **supervised.** This simply means that there is a small but continuous "supervisory" current in the line at all times. It is DC whose polarity is reversed when the intrusion system is triggered. Since the line current is supplied by the system inside the premises, any precautionary cutting or shorting of wires by an intruder immediately trips the alarm at the central location. No other straightforward system affords this supervision.

Most central station alarms are **silent,** meaning that there is no bell, light, or other indication at the protected premises to warn the intruder that he has been detected. The philosophy behind the silent alarm is committed to **apprehension** of the burglar, rather than to prevention of the losses he may cause before guards and officers reach the scene.

The Local Alarm

The local alarm is the simplest and cheapest. Having no connection with a central station, the police, or the telephone system, it relies for its effectiveness only on a loud bell, siren, or howler at the protected premises. Such alarms are intended to scare off the intruder through his fear of discovery by a citizen (or passing policeman) who may hear it. While this reduces the chances of apprehension, it also reduces the risk of loss or vandalism at the hands of an intruder—if he is the cowardly type!

Local alarms are widely used with some success in business districts where there are frequent police patrols, and in residential areas where a citizen may alert the police when one sounds. However, many transmitter sites are located in sparsely occupied areas where a strictly local alarm is likely to be heard only by the intruder himself, who well may be intrepid enough to merely break on in, find a means to silence it, and then go about his skulduggery unmolested.

It is a simple matter to combine the local and the central station systems, if desired. The same equipment that signals the central location can also ring a local bell, turn on lights, or perform any other local function. The choice lies with the system designer and the relative priority he places on loss prevention versus apprehension.

The Silent Alarm

A silent alarm is one which gives an intruder no audible or visible warning that he has been detected. This applies to most central station systems, but the term is more popularly used in reference to a system utilizing a telephone dialer, which automatically calls pre-determined numbers and transmits a recorded message. Such a system resembles the local alarm in that a special telephone line is not required, **provided** that the premises are served by a standard telco subscriber phone. The dialer is simply

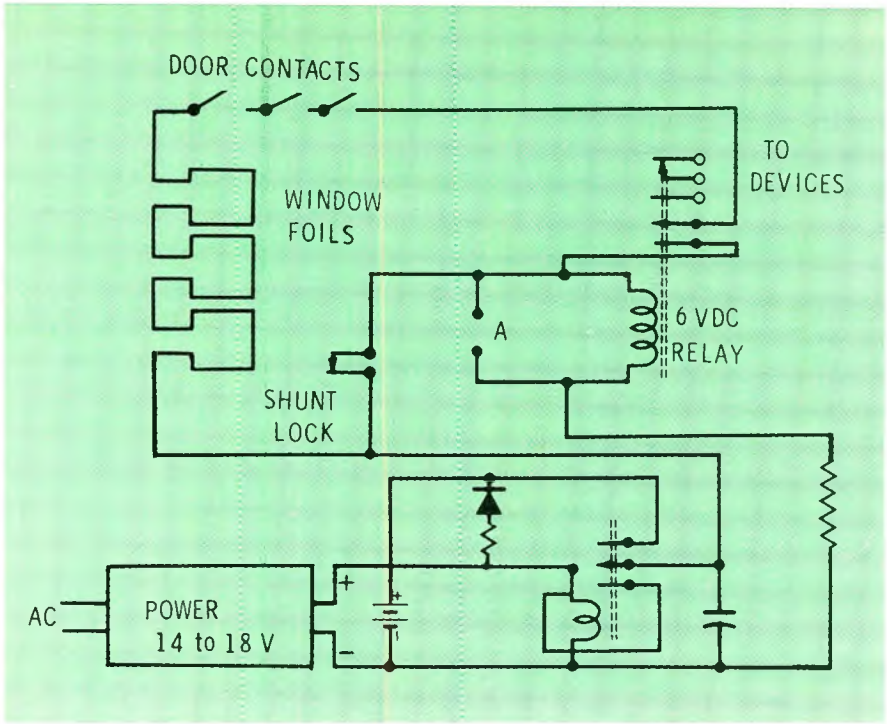


Fig. 3 An AC powered simple broadcast system capable of including a variety of sensing devices. Note that this circuit includes provision for battery operation and it also has a shunt lock.

connected to the system in place of the bell, siren, or whatever, and to the telephone line through a suitable coupler.

The dialer usually incorporates an endless tape cartridge of some configuration, on which are recorded tone-pulse sequences representative of an appropriate phone number, followed by a voice announcement to the effect that a burglary is in progress at that location.

It is common practice for the tape to contain at least three recorded messages. The first may be preceded by the number of the local police; the second by that of the station manager or chief engineer; and the third may again be directed to the police. While the tape will run the entire sequence of calls when it is once triggered, most dialers cannot sense a busy line and then re-dial, so it is best to repeat the call to the police.

The dialer offers both features and drawbacks. It is silent; it can be programmed to call any desired numbers; and it doesn't require a special line where phone service already exists. However, it (usually) cannot sense busy numbers; precautionary cutting of phone lines by an intruder will render it useless; and legally it requires a telco coupler with its small but continuing expense.

It is important to note, too, that in some cities it is illegal for a dialer to call the police with a recorded message. Perhaps one day the courts will decide upon the constitutionality of such laws, but in the meantime it is prudent to investigate before programming a dialer with the local police number.

The Total System

A complete system requires one or more intrusion sensors, such as switches on doors, foil on windows, etc.; a signaling or alerting device, which may be a bell, a dialer, or a central station transmitter; and a control unit, which interfaces the sensors and the signaling device. These are indicated in block form in Figure 1, along with another vital requirement: the disabling switch, which enables authorized personnel to disarm the system before entering the premises and to arm it upon leaving.

The Shunt Lock

The conventional disabling device is a key-operated switch known in the trade as a "shunt lock." (It customarily is connected in parallel, or "shunt", across the sensor contacts on the door used for authorized exit and entry.) The usual shunt lock is designed with a cylindrical, threaded two-piece barrel that mounts through a wall and is secured from the inside. For walls in excess of five inches or so thick, it can be extended by a length of "running thread" and a suitable nut.

The better shunt locks are provided with cylindrical keys, which are relatively difficult to duplicate, and which also may lie awkwardly among others on a ring. The cylindrical-key lock is a considerable obstacle to the amateur lock-picker, too.

Other locks can be used with equal effectiveness. Any key switch will serve, if it can be mounted so that it cannot be opened or removed from the front, **and** if the key is removable in both the **on** and **off** positions. Incidentally, the usual circuit renders the alarm system inoperative when the key switch is electrically "on".

When the shunt lock is connected to disable only the door of entry, there must be another switch somewhere within the premises that will disable the entire system, so that other doors or windows may be opened after an authorized person enters. An alternative that is to be preferred in many installations permits the shunt lock to disable the entire system, thereby simplifying routine opening and closing of the premises. This only requires that the wiring from the lock be run to the control unit, where the appropriate points of the circuit are available.

The Control Unit

The system control unit serves to translate the brief contact closure (or opening) of the sensor on a door that is opened and then closed behind an intruder into a continuous alarm signal. It may be suited for a variety of sensor types, and it supplies power for these and perhaps for the supervised line to a central station.

Commercial systems may employ very sophisticated control circuitry, but far greater reliability and freedom from false alarms can be had from simple, straightfor-

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ward configurations. One of the most popular and reliable commercial units uses two DC relays in a circuit essentially similar to that of Figure 2.

In this circuit, the **supervisory** relay is a highly sensitive, low-current model that is continuously energized when the system is armed. The low current permits the system to operate around the clock for months on #6 dry cells or a Hotshot battery, although AC power with battery backup usually is used today. The high sensitivity allows small, inconspicuous wire to be used even in very large buildings without introducing resistance problems. (Note that the sensors are wired in series to form a closed loop, which carries a supervisory current. Opening any door, therefore, or cutting a wire, will break the circuit and sound the alarm.)

This control unit is designed to operate a bell, siren, or other relatively high-current device, which may even be powered directly by 120V AC. This requires heavier contacts than a high-sensitivity relay can operate, so another one—the **alarm** relay—is used. It is connected so as to be self-latching, once the supervisory relay drops even momentarily. Once closed, the alarm relay remains energized until it is released by the re-set switch.

A Simpler One

The simple control circuit above is both reliable and flexible, adapting itself to a large variety of sensors and signaling devices. However, an even simpler approach may serve the broadcaster equally as well. One, AC powered with battery backup, is suggested in Figure 3.

Since a system for broadcast premises, where power is available, is not required to operate from batteries for other than brief power interruptions, a less sensitive and more powerful relay can be used. This permits a wider choice of contact configuration and capacity. Probably the contacts won't have to be rugged enough to operate 120V AC loads, either. Thus a single relay (exclusive of that in the power supply) can be used to supervise the protective loop **and** to trigger a dialer, a low-voltage bell, or a similar alarm device. It needs one contact available for self-latching and, if it is to be used for a central station alarm via a supervised telephone line, the relay must have enough contacts to produce a polarity reversal of the line current.

In operation, the relay is continuously closed, with the holding current routed through the protective loop. Opening any door or other protected access releases the relay, thereby closing contacts to operate the alarm device. The relay remains in this de-energized state until the system is intentionally re-set. Note that no separate re-set switch is required; the shunt lock performs this function automatically when its contacts are closed to disarm the system for authorized entry. □

* *As reported in* **Broadcast Engineering**, *September, 1972.*

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Adding IM tests to your audio proof

The author tests a new design For IM distortion at the breadboard stage of development.

By Dennis Ciapura*

While most of us will concede that there is sometimes an audible difference between two pieces of equipment which are almost identical with respect to frequency response and harmonic distortion, there is often more to the "sound" of a broadcast station than meets the eye, ear or harmonic distortion meter.

An FM stereo facility which exhibits a fine audio proof can still be plagued by ragged treble reproduction, and it is quite possible for an AM station to sound muddy despite normal harmonic distortion levels. The reasons for these phenomena lie in the inability of the standard harmonic distortion test to reveal distortion components that are very close in frequency to the fundamental modulating signals. Any "sound" can be pinned down and analyzed if one knows what to measure and how.

Ragged Treble

A very useful, but for some reason, infrequently used investigative tool is the I.M. distortion meter. To illustrate how the I.M. test can be surprisingly informative, let's take a look at the FM stereo station with the ragged treble.

With a 10 kHz modulation signal, system non-linearity would cause harmonic generation, the amplitude of which would depend upon the degree of non-linearity. However, the second harmonic of 10 kHz is 20 kHz. Stereo generators contain 15 kHz low pass filters to attenuate supersonic audio to prevent it from entering the 19 kHz pilot and 38 kHz sub-carrier spectrum.

Figure 1 shows the frequency response of a typical FM stereo audio channel. Note the extreme attenuation above 15 kHz. While the characteristics of the low pass filters employed may vary slightly from generator to generator, one thing is certain: The response at 20 kHz is negligible and so is the validity of our 10 kHz harmonic distortion test!

At first thought, you might conclude that since the low pass filters have removed the harmonics and they aren't transmitted, the distortion is not transmitted; so, there is no problem. The filters have indeed removed the harmonics but unfortunately, not the non-linearity. By the next morning the proof has been filed and all is well with the world; the system once again throbs to the tunes of the times albeit with ragged treble!

Each time a pair of signals passes through the system, the non-linearity therein produces sum and difference frequencies in mixer fashion, each tone doing it's best to blur it's neighbors. For example a 100 Hz bass fundamental and 10 kHz treble fundamental would intermodulate in a non-linear system to produce 10,100 and 9,900 Hz. The frequencies employed for most I.M. tests are 60 Hz and 4, 5, 6, or 7 kHz mixed 4:1. This combination gives a pretty good idea of how faithfully music would be reproduced because the most difficult musical wave forms to handle are usually those with many instruments and a heavy bass undercurrent.

It is obvious from this simple case that much can be done to ruffle the edges of an FM station's on-air fidelity with distortion components well within the normal 15 kHz band-pass despite the attenuation of higher harmonics.

Low Level Problem

At this point, it is interesting to note that a sort of reverse situation can also arise. The harmonic distortion meter is indiscriminate of noise and distortion; they both read on the harmonic distortion meter, a problem that makes measurements at low levels difficult, particularly near 60 Hz hum components and at the higher frequencies where hiss can cloud the issue. Unless you are very careful in monitoring the output of the harmonic distortion meter on a scope to determine the nature of the gremlins behind the needle deflection, a great deal of time can be wasted in search of a non-linear condition when the problem is really noise or oscillation.

*CE, WLIF-FM/WTOW AM Baltimore, Md.

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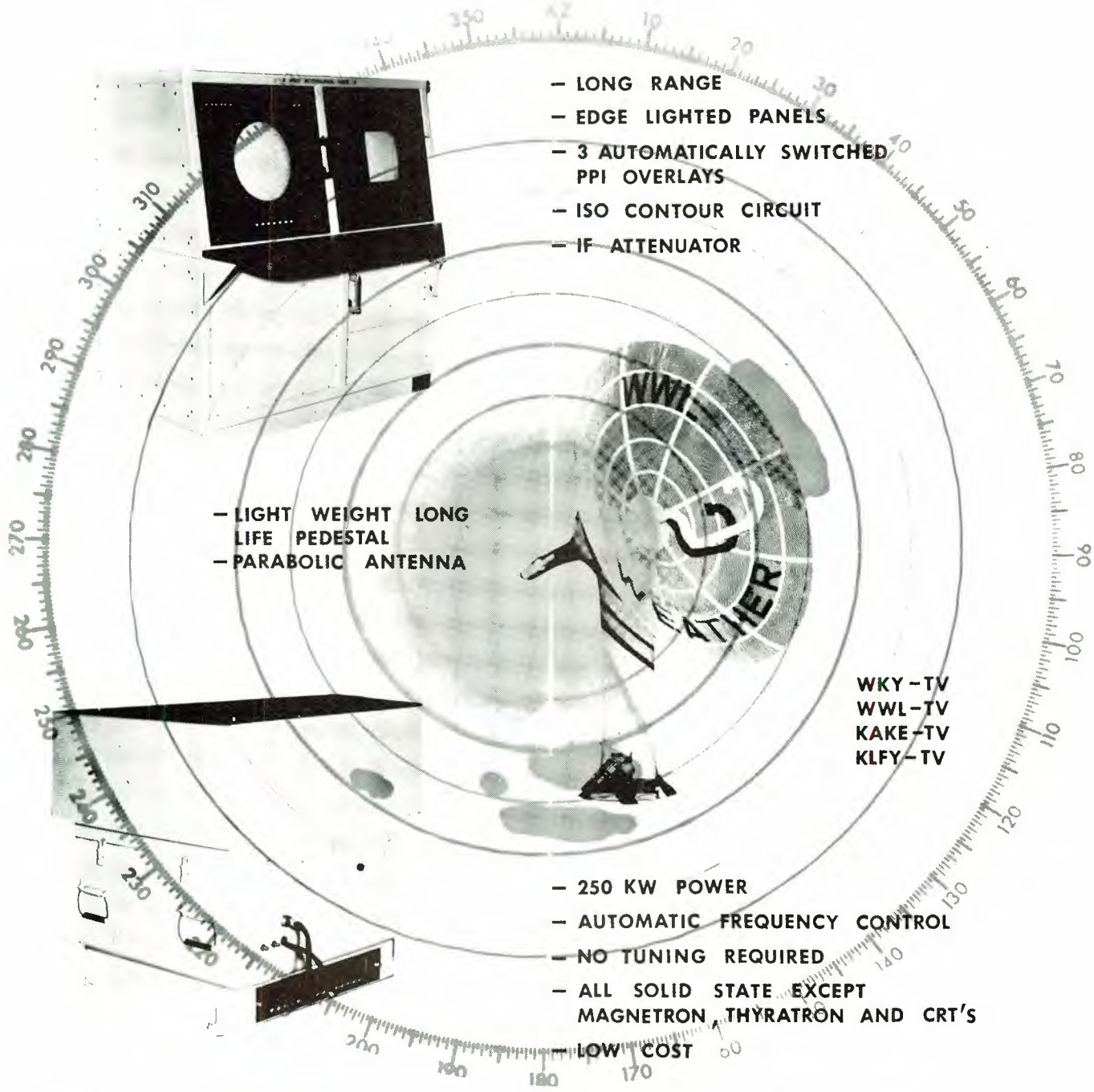

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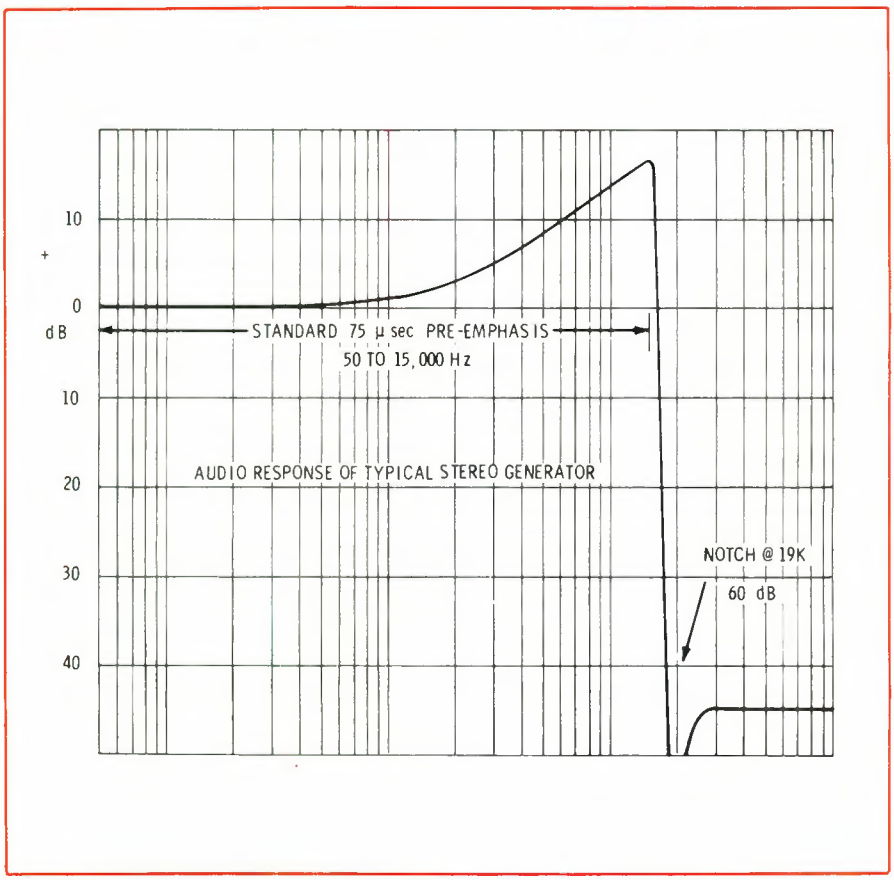


Fig. 1 Frequency response of a typical FM stereo audio channel with extreme attenuation above 15 kHz.

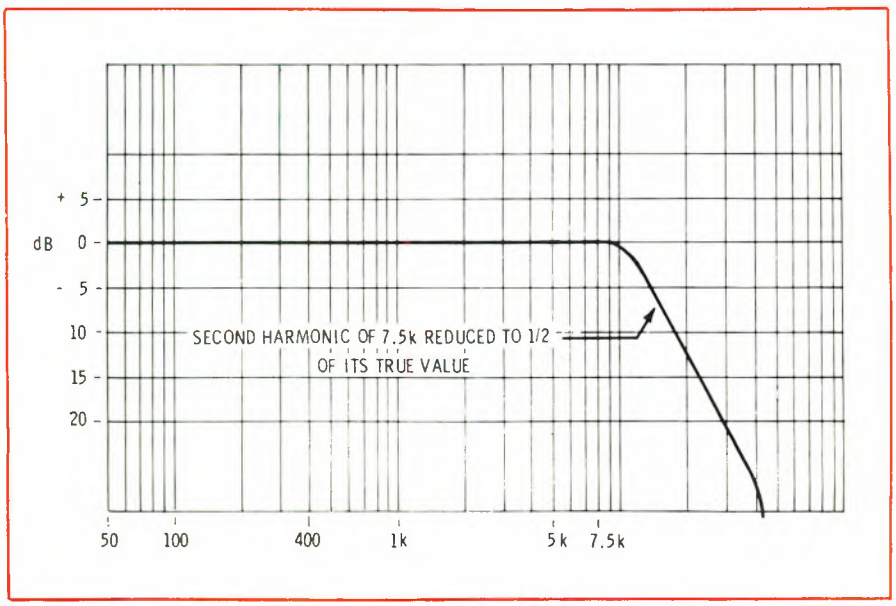


Fig. 2 Frequency response of transmitter with 12 dB/octave roll-off after 10 kHz.

The I.M. distortion meter is generally insensitive to noise unless it's amplitude is great enough to modulate the test tones; and incredibly bad signal to noise, or more accurately, noise to signal ratio to be sure. This characteristic insensitivity to noise also makes measurements in the .1 percent distortion region (very real for some of the newer equipment) less difficult. At .1 percent, distortion is 60 dB down. Making a harmonic measurement at −20 dB level would require an equipment noise level of −80 dB just to keep the noise from exceeding .1 percent. Some harmonic distortion meters provide a built-in 1 kHz high pass filter which can be switched in when making measurements at low levels to reduce hum interference or at least help identify it as such, but any white noise components above 1 kHz would, of course, be unaltered.

AM Muddy Sound

In the case of the hypothetical AM station with muddy sound, some AM transmitters employ 10 kHz low pass filters to prevent adjacent channel interference and these do make meaningful harmonic distortion tests at the higher audio frequencies invalid, or at least of questionable integrity. (See Figure 2.)

But, as was the case of the FM stereo station, it is not these harmonics that we are concerned with. Even if they were transmitted, aside from the adjacent channel interference they would cause, they would not be reproduced by any usual AM receiver. The nonlinearity that caused the harmonics to be generated will, as in the last example, engender sum and difference frequencies.

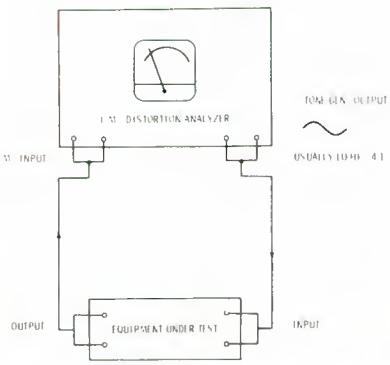
In the case of an AM transmitter we are often throwing a lot of audio power around, sometimes tens of thousands of Watts, and a lot of it passes through transformers. While SAM the bass-man's highly plucked bass-guitar may slightly

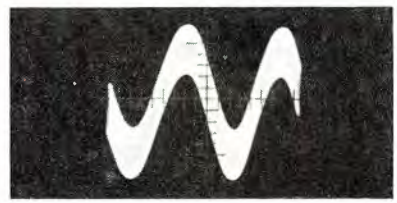
saturate the modulation transformer core, the harmonic distortion generated might not be too audible. But, the resulting I.M. distortion could very easily melt the rest of the instruments into a rather unmusical conglomerate.

Obviously, the best analysis of any piece of audio or audio handling RF gear is a combination of both harmonics and intermodulation distortion tests. Good I.M. distortion measuring equipment can be obtained in kit form for less than $100.00 with built-in signal generators. For pre-wired units, check your September issue of BE.

It is surprising that I.M. measurement gear is not more common at broadcast facilities, when you consider the simplicity and flexibility of the method. Certainly the fact that the FCC does not require I.M. measurements is one determining factor. However, no one will deny the fact that we must broaden the scope and sharpen the image of our "air product" analysis if we are to advance the state of our broadcast art.

Test setup for IM measurement.





Classic "two tone" IM test signal: 60 and 5000 Hz at 2:1. The level of the high tone was exaggerated for the sake of illustration. A 4:1 ratio of low to high tone is normally employed, but most IM gear allows the user to vary the ratio for more flexible investigation. A 6:1 ratio might be more helpful, for instance, in shaking out a muddy telco loop.

As was mentioned in the text, an I.M. distortion tester is usually a dual instrument, in that it contains a two-tone generator and an I.M. distortion measuring section combined in a single instrument called an I.M. distortion analyzer. The tone generator output is fed into the audio equipment or system under test and the I.M. meter input connected to the output of the unit or system as shown in the diagram.

Measurements can be made very quickly, because I.M. distortion meters usually do not have tuning or nulling circuits to be adjusted and re-adjusted. The usual impedance matching considerations do apply, however, and some units have internal loads of various impedances to render this requirement easily met.

One of the best values in an instrument of this type that we have come across is the Heath IM-48 which has built-in dummy loads and also functions as an A.C. V.T.V.M. It sells for about $70 in kit form. □

New IC timer debut for

A unique yet-simple advancement in time control techniques for almost any purpose has been made by Signetics Corp. in the form of an inexpensive integrated circuit, according to Arthur E. Fury, Marketing Manager for the Signetics Linear Integrated Circuit Department.

The compact new timer will do almost anything that anyone ever wanted from a time-delay device of any kind. The typical time-delay relay, with a five percent accuracy sells for about $15.00, but the five percent version of this timer sells for 75 cents each in lots of 100. It also has an added advantage in that the timer is absolutely silent. The initial version was designed by Hans Camenzind of Interdesign Inc.

This universal timer, which is designated as the Model "555," will produce fully controllable time-delays between one microsecond (one millionth of a second) and one hour. If the timer is allowed to run free, it can be set to oscillate at any frequency between one megahertz and one pulse per hour (or, 3.6 millihertz). All that are required are an external resistor and a capacitor; the timer is internally compensated for component tolerances and temperature drifts. The temperature coefficient is rated at approximately 25 parts per million per degree Centigrade.

Intended for wide-ranging uses that include industrial control systems, and sophisticated electronic equipment, the timer can be used specifically for simple time delay, time sequencing, pulse generation, missing pulse detection, frequency division, pulse width modulation, and pulse position modulation.

Other features include the ability to operate in both the astable and monostable modes. Terminals are provided for triggering or resetting the timer. For stable operation as an oscillator, the free-running frequency and the duty cycle are both accurately controlled by two external resistors and one capacitor. Falling waveforms may be used to trigger and reset the circuit.

Internally, the timer consists of two comparators, a "flip-flop" (a bistable multi-vibrator), and a buffered output stage. The output structure can source or sink up to 200 milliamperes, which means that it can drive standard TTL

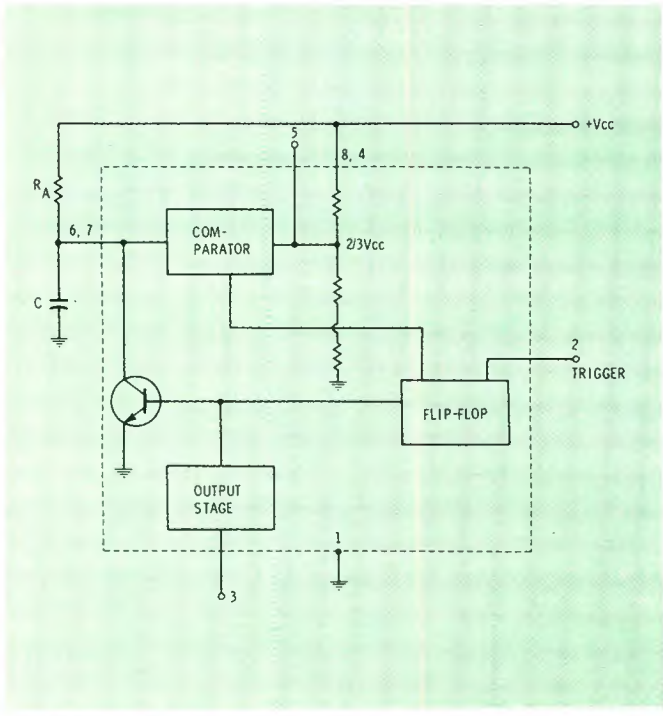


Fig.1 Block diagram for triggered mode.

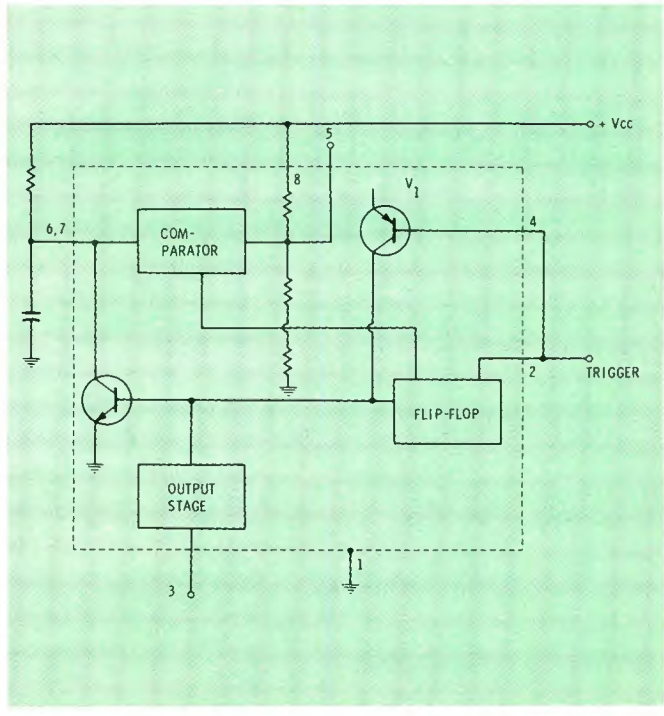


Fig. 2 Triggered mode with forced reset. The timing cycle starts anew each time the circuit is triggered.

(transistor-transistor logic) circuits. These loads can be connected either to the "Vcc" terminal or to ground. Both "normally on" and "normally off" loads can be driven because the output stage is an inverting type which uses two high-current transistors.

Circuit Description

The functional diagram of the SE/NE 555 is shown in Figure 1. Initially, the external capacitor is held discharged by the transistor inside the timer. Upon triggering, the flip-flop is set to one side, which releases the short circuit across the capacitor and also moves the output level toward Vcc. The voltage across the capacitor, therefore, starts increasing exponentially with a time constant $T = R_A C$. A high impedance comparator is referenced to ⅔ Vcc with the use of three equal resistors. When the voltage across the capacitor reaches this level, the flip-flop is re-set, the capacitor is discharged rapidly, and the output level moves toward ground.

This is the basic operation in the triggered (monostable) mode. The trigger level, located at ⅓ Vcc, is compatible with IC logic levels; the circuit triggers on the negative going slope. Once the circuit is triggered it will remain in this state until the set time is elapsed, even if it is triggered again during this interval.

The charge time constant is $R_A \times C$; the end-of-cycle voltage level is set at 2/3 VCC. Thus the total time (output high) is

$$t = 1.1\, R_A\, C \qquad (R_B = O)$$

Notice that both the charge rate and comparator level are a function of the supply voltage. In fact, the two effects cancel exactly and the time is independent of the supply voltage.

Reset/Restart

Connecting terminal 4 to the trigger input (Figure 2) restarts the timing cycle each time the circuit is triggered. This is accomplished by activating the internal discharge transistor with the trigger pulse directly. In this mode the circuit can be triggered anytime during or after a timing cycle; the new timing cycle will start on the positive going slope (at approx. 0.7 Volts). The same expression for time as above applies.

When terminal 4 is not in use it is recommended that it be connected to Vcc to avoid any possibility of false triggering.

Photo Timer

Figure 3 shows the circuit connected as a manually started timer. The time can be set in the range from 1 to 60 seconds with a potentiometer; a thumbwheel switch with fixed resistors could also be used.

Two loads, one normally "on", the other normally "off" can be connected to the circuit simultaneously. In this application the circuit could power a relay, a small lamp, or a controlled rectifier.

The "555" timer is guaranteed for normal operation over either of two temperature ranges, 0°C to +70°C for the "NE555" and −55°C to +125°C for the "SE555." The timer is manufactured in two types of package—a round "TO" can with 8 leads, and a silicone plastic package with two rows of pins (8-pin miniature dual-in-line package). □

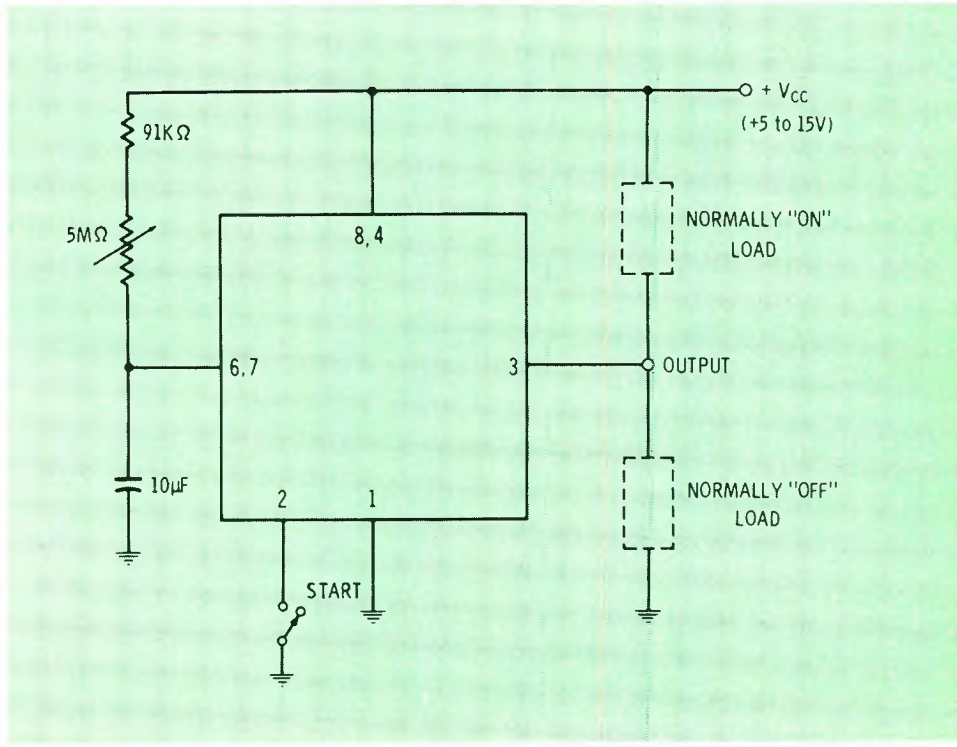


Fig. 3 Photo timer for 1 to 60 seconds.

Adaptability-Versatility....

KVGB meets its real needs

By Lawrence R. Knupp*

If you looked at a calendar, you might say the KVGB Operations and Engineering staff spent only about four months designing its new studios in Great Bend, Kansas. If you looked at the history of the situation, you'd know we spent about five years doing it.

We knew we had to move and we dreamed a lot. So, when Forward Communications Corporation announced in July of 1971 the purchase of a new building for our studios and offices, we felt a little like Cinderella at the ball.

Not only was the building one of the plushest in the area, it was big. We would own a two-story building with each floor almost twice the size of the old facility in a local bank building.

The tale of our old station is an all too familiar one; designed for the needs of radio 18 years ago. By 1971 we had a mess. Since the old facility was built, cartridge tape machines had made their appearance, weekday network programming (other than news) had largely made its exit, as had local live programming. Disc jockeys had come on the scene with accompanying stacks of records, and voice connector telephones also had made their entrance since AT&T boosted long-line costs.

We decided from the outset that our new facility would be designed with several criteria in mind: **adaptability** and **versatility** to most any situation with a minimum of fuss. It would include convenience for the operator **and** the engineer, and planning for the future as best we could.

In general, the facility was designed by the people who work in it and operate it. The engineering staff, of course, made some changes of their own, and made the whole thing work.

*KVGB Radio, Great Bend, Kansas.

How To Get Adaptability And Versatility

Since we had had a number of years to contemplate our sad situation, we started designing with a sure and certain knowledge of what we wanted to avoid . . . with a few ideas of how to avoid it.

First, we asked ourselves, Why is it that a Maggie 1021 or any piece of equipment has to be locked into the Control Room, or into a production studio? Why lock it anywhere? How to solve the problem? With plugs . . . lots of plugs wired to inputs in all three boards (Control Room and two production studios) to allow us to move everything for our own convenience for a bigger production job than we would otherwise be capable of, or for an emergency.

Front view of the new, modern KVGB studios.

The first design that grew from this was our main recording facility for the Control Room. We had two Maggie 1021's and they were permanently wired in the Control Room in the old building.

When the carpenters built the consoles to our specifications, they also built an enclosed rack of wood and covered it with Formica to match the Control Room console. Then, they put the whole thing on casters. We put two Maggies into it along with one RCA record playback machine. All the inputs and outputs were placed onto one cable with a 24-prong Jones plug. All the remote starting and stopping circuits and indicator lights were put into two cables; one for the Maggies, one for the RCA, each with plugs.

The matching sockets were wired into the appropriate places in the Control Room and two production studios, and we built a little hand-held remote control box that has Jones plug sockets for the production studios. Now the whole thing rolls down the hall to any production studio as necessity calls, and simply plugs it in. Instead of using the equipment about 20% of our broadcast day, we now use it closer to 60 to 70%, and we think of that as savings.

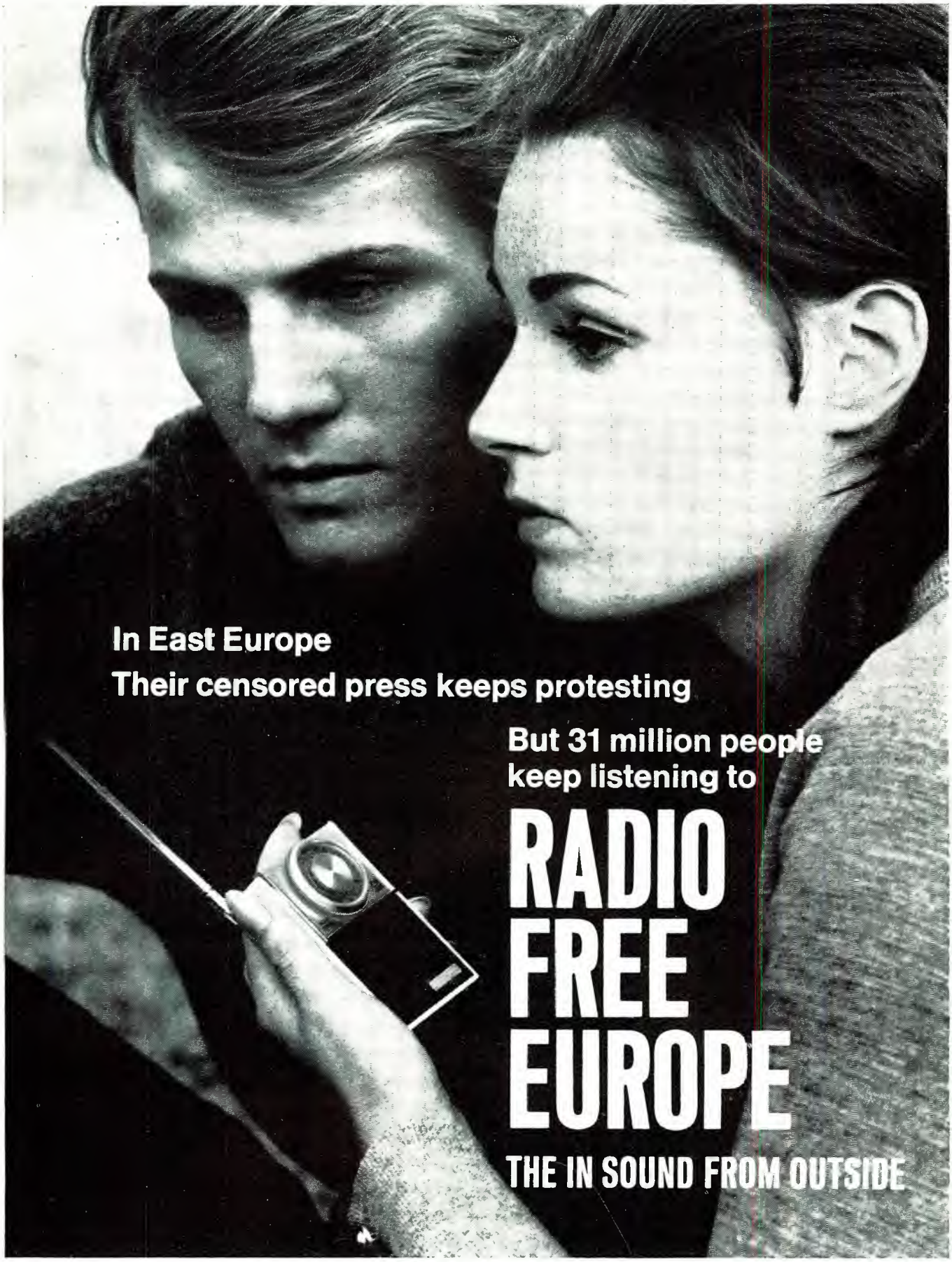
All other equipment, such as cart machines and tape recorders have their appropriate plugs with matching sockets and inputs in all three console locations. So any piece of gear goes anywhere, anytime.

One of our biggest problems had been our inability to adapt to emergency and changing situations . . . especially when it came to such problems as carrying one ballgame, recording another, and feeding each of the other two to other stations.

Enter The Patch Panel

The answer to that was obviously a patch panel. We made ours large enough to handle **every** circuit in the station with room to grow. We put it to the side of the Control Room operator, so he has instant access to it. Hardly a new idea, but when you've never had one, it's a new convenience. Instead of a regular rack, we installed it in a turrent with a lift-off cover, so it's all accessible.

Every input and output on the



For information about East Europe and RFE, write:
RADIO FREE EUROPE, Box 1972, Mt. Vernon, New York 10551

new Gates Diplomat console terminates in this patch panel, with all inputs and outputs of all equipment and all telephone company circuits. In addition, there are multi-pair cables between the newsroom, the two production studios, and the Control Room . . . and all terminate in the panel. There are plenty of empties in each cable, so we're in good shape for circuit growth without having to string any new cable.

Each production studio has its own patch panel, so feeds can be made in any direction, anywhere, at any time.

Studio Control

The old facility had three live studios and one Control Room. The big live studio was also the production studio. Since the days of live music are over, at least in this market, we went to only one live studio, big enough to handle a small group, such as you might have on a talk show. That studio is completely controllable from all three consoles.

We also went to a numbering system on commercial cartridges and put all those and the formats into two 200 cart capacity Spotmaster racks. Both were mounted in another rolling cabinet. So, in any type of Control Room emergency, we make one patch, roll two cabinets down the hall, plug in our four-unit Sparta Cart playback, and we're back in full capacity business in a production studio.

Operator And Engineer Convenience

A number of items were designed for the convenience of operator and engineer.

Since the operator is the one who uses it day in and day out and contends with all its idiosyncrasies, the initial design of all facilities was made with him in mind. Then, some revisions were made by the engineers for technical or servicing reasons.

The first thing we built was an extensive remote control system, especially on Control Room equipment. All start and stop switches are momentary, operating relays and are lighted to indicate status. The Sparta 4 machine deck was remoted both into the newsroom and the live studio. This allows the man on the air in these locations to control his own spots, and it eliminates the need for a considerable amount of mind-reading—which is always difficult under studio conditions.

Announcer-engineer Boyd Rodman plugs in the roll-about equipment rack in the main control room.

Chief Engineer Harold Riedl (R) and engineer Walt Patterson inspect their homebrew console in the newsroom.

Everything was placed within easy reach of the operator. The Control Room also has a small news desk, because our nightman is combination DJ and newsman.

Phone Lines

Since voice-connector phones are the device of the present for sports remotes, and since we carry a lot of locally-originated sports, we installed two phones on our special voice-connector numbers. These phones were placed in a special enclosure at the right side of the operator, under the console top. They are terminated in the patch panel with the most used going on into the console. The operator gets his man on the phone, switches two switches on the phones, lays the receiver in the compartment, and closes the door. The phone is safe from inadvertent blows, uneducated handling, and parties in the Control Room during long games.

The Gates Diplomat intercom/talkback system permits two-way conversation over the voice connectors, or any remote.

As with all remote control switches, all input and output switches are lighted to indicate sources and conditions.

Special care was taken with planning all access panels in consoles to permit the engineers quick access to all interior areas without being an Olympic gymnast. All wiring can be exposed.

Interconnecting Cables

We faced one problem with the major interconnecting cables. Most stations, including our old one, run these under the floors in conduit.

We had several reasons for avoiding conduit. First, it would have required extensive work in the lower level of the building, and punching holes in a concrete floor, including tearing out the acoustical ceiling which would have been very expensive. Second, it was difficult to wire, both from the installation and removal standpoints, and you have some trouble tracing wires visually.

Instead, we built our conduit on the side of the wall. We had a local sheet metal shop build long boxes of heavy galvanized steel, about four by ten inches, with the lengths determined by the sizes and layouts of the rooms where it would be installed. The boxes were closed, even at the end. One 10-inch side was the lid, a very tight fit. We built it to be closed with sheet metal screws, but got such a good fit we left them off.

The boxes were installed about 18 inches off the floor before any cabinetry was built, and 1½ inch holes were punched in the ends. Then, the holes were punched on through the wall to the next box.

All cables were installed through the boxes and the holes to their destinations. The cables are completely accessible at any time, and it takes less than 15 minutes to run a new cable from one end of the operations area to the other. The method has worked very well, and we have had no trouble with crosstalk or spurious noise.

Our multiple circuitry takes a little of the pressure off the engineer. We have so many back-up systems possible that we can switch almost anything over to another, while the engineer works on the main problem.

Keep The Record Straight

We built the main telephone company terminal at stand-up height in the newsroom, next to the Control Room. All wiring terminates on barrier strips, and is completely labelled.

The most important thing, after our prior experience, was to take the time to completely and clearly mark all cables and terminals, making complete diagrams of everything. These, along with all equipment manuals, are kept at the studios.

Since our main repair shop is located in the transmitter building about three and a half miles southwest of Great Bend, we built an auxiliary workshop in the basement of the studios, stopping a lot of the hauling of equipment that went on in the old days.

Another little innovation was made in the production studios. We built "swing-down and out" rack units in both production consoles, thus avoiding the usual, rather ugly, equipment racks. These house amplifiers and power supplies for the older, tube-type production consoles. Plans are to replace these in the next few years.

We realized that working in an unattractive location such as our old studios was depressing on our staff, especially the air staff. So we spent a little money to make the place look like the rest of the building. And it wasn't all that expensive. We used indoor-outdoor carpet on the walls, instead of expensive sound material, and have been very pleased with the results. We decorated in gold, browns and greens, with woodgrain formica on the work surfaces. In fact, all consoles are completely covered with formica. It is more expensive, but will still look great in 20 years.

We may have a little too much glass surface, especially in smaller rooms, as we have had some trouble with sound-bounce from glass. We compensate for the small echo by working closer to a lower level microphone.

We have more yet to do . . . we still have not brought the facility up to its full equipment complement, but that will mostly come in the next year.

In The Newsroom

Perhaps the design that turned out best was for the newsroom. We attempted to build a newsroom for today's type of electronic journalism, and for the forseeable future. It's a little control room/production studio in its own right.

It has its own mixer/control board for all audio sources in the newsroom, a home-brew job that works well. It lets us record almost anything anywhere, and play it back with nine inputs and four outputs. The news mike is switchable to either on-the-air or recording in the newsroom. Control Room cart machines are controlled in the newsroom. The newsroom is equipped with two record/playback cartridge machines and a reel-to-reel tape recorder. This operation was designed to allow the single newsman to run his own show with great-sounding results.

Having been in our new facility since January 9, 1972, we have found one thing to be the most amazing of all . . . we haven't found anything we missed.

All in all, the design has resulted in a tremendous time saving to everyone concerned. The design permits one man to do the work of two in our old studio. There's a minimum of running between studios, snafu's, and dropped cues.

We feel we have gained the adaptability and versatility we went after in the original design. The air sound and the production work have improved considerably since a very wide range of equipment is available anywhere in minutes.

Equipment is used where it is needed, not just where it's installed. Even though we have hardly used the back-up systems so far, we know they're there and ready to go. The only real emergency we've had so far was when we lost power at the studios during a thunderstorm and tornado alert. We plugged a battery-operated remote sports amplifier into the patch panel input to the transmitter, and were back on the air.

That's "adaptability", except for the fact we didn't have a single flashlight in working order. We had to appeal for candles and flashlights over the air. We got them, too.

Editor's Note:

Too often, I'm afraid, the facility modernization program becomes one of turning the station into a show place. Visitors may be impressed, but your signal is what you sell. And it does make sense to provide designs and decorations with the air people and engineers in mind. Perhaps some of you have already seen facilities that look like second grade ham shacks . . . and others that are attractive, but impractical. We think KVGB is on the right track.

If you have developed new designs for old problems, we'd like to hear about them regardless of your market size. □

(Continued from page 16)

The first October meeting was on the 3rd at RCA, Camden, N.J. featuring a demonstration and discussion on the RCA TCR 100 video cartridge tape machine. The arrangement was a special for the SBE. On September 25th, Art Silver of Gates Radio Company presented a talk and slide viewing on The Pulse Duration Modulation System of High Level Modulation in Broadcast Transmitters.

Chapter 20—Pittsburgh, Pa.
Chairman: Henry R. Kaiser, WWSW, 1 Allegheny Square, Pittsburgh, Pa. 15212

The Pittsburgh chapter, recently reorganized, meets regularly at 12 noon on the 3rd Thursday of each month at Buddies Restaurant, 439 Market St., Pittsburgh. The most recent meeting, Nov. 16th was on Wollesack Videocassette equipment. At this demonstration, the CBS noon news was video recorded and then played back immediately afterward.

The meeting of October 19 was elections; the preceding meeting, September 28th, was for the purpose of reorganizing.

Chapter 21—Spokane, Washington
Chairman: T. O. Jorgenson
KXLY TV, Spokane, Wash.

Chairman "Jorgy" Jorgenson reported by telephone recently that the Spokane chapter had been inactive for a period but now meets every Monday at 12 noon at the Castle Restaurant, Spokane.

The most recent meeting, November 20th, consisted of a group discussion on subcarriers, color news cameras, and portable videotape equipment. The occasion was also used to observe the 50th anniversary for KXLY which started at 10 Watts in 1922 and is now 5000 Watts nondirectional. Honored at the luncheon was retired chief Langford whose spark Transmitter call letters were 7ABX.

"Jorgy" suggests that, instead of "brown-bagging" it on Mondays, everyone interested in technical aspects of broadcasting should come to the luncheon meetings.

(Continued on page 56)

Radio Code: Avoid Sex Sensationalism

The Radio Code Board of the National Association of Broadcasters unanimously passed a resolution cautioning Code subscribers to handle talk programs featuring discussions on sex "so as to avoid sensationalism."

At the one-day meeting Monday (Nov. 20) the Board, under the chairmanship of William W. Hansen, general manager, WJOL-AM-FM, Joliet, Ill., approved the following resolution: "The Radio Code Board is aware of the concern about increased candor on some radio talk shows that feature discussion of sex matters. The Board calls on Code subscribing stations to be alert to their individual responsibilities on this issue. "The Radio Code Board further recommends that broadcasters take into account the sensitivities of the communities they serve in determining when and how to air such programs.

"Further, the Board cautions that such programs be responsibly handled so as to avoid sensationalism or advice which goes counter to generally accepted medical opinion."

In other important actions, the Board:

● Rejected an appeal from New York City's Off-Track Betting Corp. (OTB) to relax radio code policies governing off-track betting radio advertising. OTB had petitioned the Board to relax current radio code policies so as to allow more scope for statements and claims in OTB commercials.

Current radio code policies, as implemented by the Code Authority under a directive from the Radio Code Board, require that off-track betting advertisements be institutional in nature and avoid any exhortation to bet. The Board upheld these policies and commended the Code Authority staff for its diligence in reviewing OTB commercials.

● Ruled that advertising for home-use cigarette-making machines is unacceptable under Radio Code standards. In disallowing such advertising, the Board indicated that the public interest would not be served by radio advertising for a machine, the sole purpose of which is to make cigarettes.

In another action, Radio Code Board Chairman Hansen appointed a subcommittee to review the Radio Code's program and advertising standards. The subcommittee is to report to the Board with any revisions it may wish to recommend. The members of the subcommittee are: Jack Hinton, director, Program Practices, CBS Radio Division, New York; Lee Allen Smith, manager, WKY, Oklahoma City, Okla.; and James H. Ward, executive vice president and general manager, WLAC-AM-

bookreview

Designing & Maintaining The CATV & Small TV Studio, written by Kenneth B. Knecht, is a simplified, yet detailed guide on the installation and maintenance of production facilities for CATV, CCTV, ITV, and small broadcast TV studios. This all-in-one handbook is written specifically to help those who need expert, in-depth guidance on setting up a small to medium size TV studio. The level of presentation can be easily understood, yet provides the technical details needed by those who have a knowledge of electronics. Moreover, the information provided is sufficient to serve the needs of CATV systems and educational or industrial closed-circuit systems, as well as TV broadcast stations. The book is 256 pages and includes over 100 illustrations.

This book is available through Tab Books, Blue Ridge Summit, Pa.

For More Details Circle (50) on Reply Card

The Technique of Lighting For Television And Motion Pictures, written by Gerald Millerson, presents a comprehensive study of the art of creative lighting. For the first time, the techniques and processes of lighting for motion pictures and television are investigated and analyzed.

The text progresses from fundamental principles to lighting in its most advanced forms. It enables everyone working with light, in cinematography and television, to build up methodical techniques form which personal creativity can grow. For student and practioner alike, it shows how to set about lighting in all artistic applications. The book encourages experiment, anticipates problems, and reveals opportunities. It examines each aspect of the lighting processes. Whatever project, the reader will find here generous and systematic guidance accompanied by many clear and helpful illustrations.

This book is available through Communication Arts Books, Hastings House, Publishers, New York.

For More Details Circle (51) on Reply Card

The Semiconductor Data Library from Motorola Semiconductor Products Inc., is a three-volume set. Books 1 and 2 provide complete data sheet specifications of all Motorola manufactured discrete semiconductors. The Reference Volume contains a technical description of all EIA-registered semiconductors made by the industry (regardless of manufacturer), as well as a set of selector guides covering all discrete families made by Motorola.

Drawings and schematics are included in each volume.

The Data Library is available through Motorola Semiconductor Products Inc., Phoenix, Ariz.

For More Details Circle (52) on Reply Card

PEOPLE IN THE NEWS

Robert Flanders has become Vice President of Engineering for McGraw-Hill Broadcasting Company. This duty will be added to his present duties as Director of Engineering for WRTV in Indianapolis . . . **Dr. Harold Chestnut** has been elected President of the Institute of Electrical and Electronics Engineers, Inc. (IEEE) . . . The IEEE Board of Directors announced the election of **John J. Guarrera** as Vice President. He is Chairman of the Board and President, SACOM, Sun Valley, Calif. . . . George Thomas Howard And Assoc., Theatre and Television Consultants of Hollywood, announce the appointment of **Richard D. Thompson** to the position of Senior Consultant . . . **Stephen E. Millard,** associate editor with **Broadcasting Magazine,** has joined the National Association of Educational Broadcasters December 1, 1972, as Director of Information Services . . . **Reb Foster** has been named program director for KRLA-AM, Los Angeles . . . **John J. Leay** has been appointed Manager, Technical Systems for Imero Fiorentino Associates, Inc. . . .

Robert Sidwell, V.P. of Sales of CCA Elect. Corp. announces the appointment of **Charles Hallinan** former President and one of the founders of the Society of Broadcast Engineers as Regional Area Representative for CCA Elect. for the states of Penn., N.J., Del. and Md. . . . **Eugene L. Bidun** has been appointed Sales Manager for LPB Inc., Frazer, Pa. . . . Three appointments have been announced by Dean C. Bradford, president of the ITT Electron Tube Div. of ITT Corp. **Michael F. Toohig,** an ITT Electron Tube Division vice president, has been named director of engineering for electro-optical tube operations. **Paul M. Leavy, Jr.** has joined this ITT division as director of the Tube and Sensor Laboratories, Ft. Wayne, Ind., and **Marvin E. Lahr** has been named as deputy director for administration of the same laboratories . . .

Gerald Citron has been named Director of Marketing—VCR Products at Philips Broadcast Equip. Corp. . . . **Curtis B. Balston** has been named Contracts Manager of Technology Inc., HF Photo Systems Div. . . . **Robert C. Corwin** has been promoted to Marketing Manager, Marine Antenna Systems; Phelps Dodge Communications Co., Marlboro, N.J. . . . **Joseph H. Burleigh** has been named central region franchise manager for Radio Shack Franchise International . . . **Les Farey** has been appointed manager/West Coast Engineering of Blonder-Tongue Laboratories, Inc. . . . **Alexander Korwek** has joined Reeves Cinetel, Inc. as Vice-President/Treasurer, Director . . .

Sheldon G. Rabin has joined the Signalite Div. of General Instrument Corp., Neptune, N.J., as Manager of Applications Engineering . . . **Abram E. Patlove** has been named director of development for Comcast Cable Comm. Div. of Comcast Corp. (OTC) . . .

ENGINEER'S EXCHANGE

WHCN Builds De-icer Watchdog

During the last few winters, severe icing on our antenna has caused us at WHCN (FM) to leave our de-icers on over an extended period of time. Last year, the de-icer on the bottom bay finally burned out. I decided that with our new Gates FMC—5 antenna, a change would have to come about if I did not want the same thing to happen. The circuit in Figure 1, represents a "Watchdog", which I assembled from spare parts. "Watchdogs" are available commercially for about $100, but I decided to save some money and do it myself.

Since icing causes the VSWR to rise, I tapped into our MC Jones Micro-match. The Resistor—Voltage divider network was chosen for a VSWR of 2:1 (out standard VSWR is about 1:5:1). This VSWR at 2.8 kW out of the transmitter represents about 310 Watts reflected power. The total voltage of the forward power indication represents 2.8 kW. The voltage at the R_1 - R_2 junction is equal to 1/9th the forward power indication or representative of 310 Watts. The reflected power indication voltage is directly fed into the IC. The IC acts like a DC Amplifier. The output is an amplification of the input ratio of the divider voltage to reflected voltage with the same resulting polarity as the ratio yields.

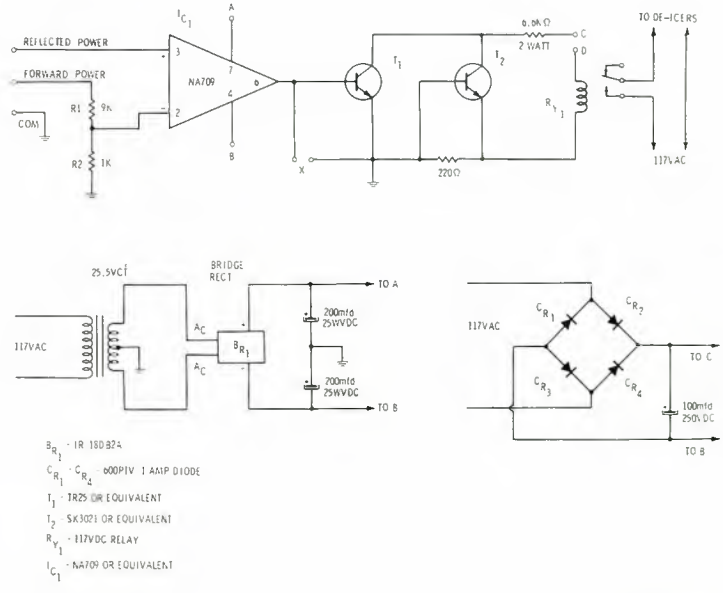
The output then drives the switching transistor base negative with respect to the emitter when 1/9th of the forward power is greater than the reflected power.

When the reflected power exceeds the selected 2:1 VSWR the base of the transistor is driven positive, thus switching the transistor to an "on" condition.

When the transistor T_1 turns "on"; the base of T_2 is run positive with respect to the emitter and it fires.

The relay is connected in series with the emitter of T_2 and pulls when T_2 is fired. The 6.6K Ohm resistor limits the current to that which is necessary to pull the relay. The de-icers are connected in series with the relay.

With some transistors, a small



B_{R_1} - IR 18DB2A
C_{R_1} - C_{R_4} - 600PIV 1 AMP DIODE
T_1 - TR25 OR EQUIVALENT
T_2 - SK3021 OR EQUIVALENT
R_{Y_1} - 117VDC RELAY
I_{C_1} - NA709 OR EQUIVALENT

Figure 1

negative bias voltage is required at the base to turn it off. If this is the case, a resistor is inserted at point X of the proper value, to turn the transistor off. With most transistors, the value is about 220 Ohms.

The ratio does not change at the upper or lower limits of the required power output level, so that when the TPO is increased or reduced, the unit still responds to a 2:1 VSWR.

Lawrence L. Titus
WHCN
Hartford, Conn.

Simple Method For Remote Pilot Control

With the recent FCC ruling requiring the disabling of the 19 kHz pilot during monaural broadcasts in excess of five minutes, a simple method of remote pilot control may be needed.

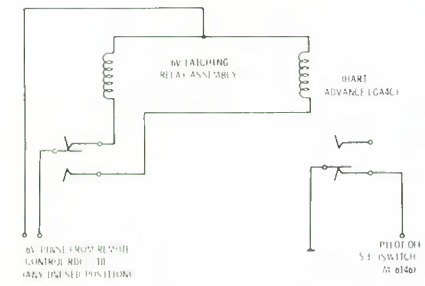
The circuit in Figure 1 was designed to operate with the Gates model RDC-10AC remote control system and the Gates model M-6146 Stereo Generator. The RDC-10AC provides a 6VDC control voltage in all stepper positions.

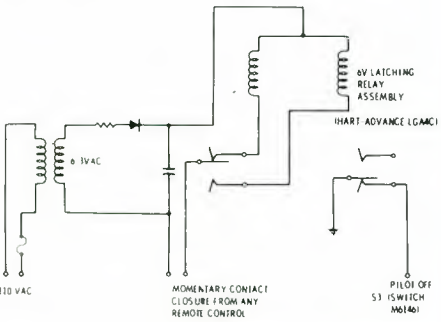
This system which can be modified to operate with almost any remote control system and stereo generator utilizing only one remote control position through a latching relay assembly. A Hart Advance LGA4C 6VDC relay is suggested.

The circuit can be modified as shown in Figure 2 for use with a remote control system that provides only a contact closure and no remote control voltage.

Pilot diable can be accomplished by grounding the grid of the 19 kHz oscillator or paralleling the "Pilot Off" switch. All wiring to the stereo generator should be kept short and well shielded.

M.W. Massey
Field Service Supv.
Gates Radio
Quincy, Ill.





Send your Engineer's Exchange Ideas To:
BE, 1014 Wyandotte
Kansas City, Mo. 64105

NEW PRODUCTS

(Use circle number on reader service card for further information)

Mixer-Monitor System

The Quantum Audio QM-8 Mixer is a compact, portable, rack-mountable unit which is equally suited for studio or field work. An 8 input, 4 output mixer, each input switchable, line or microphone. Line inputs and mic inputs are on separate XL connectors.

An input selector switch positioned above each assignment switch selects line, off, mic or mic-15DB (mic pad setting). Output of each buss is via an XL connector at +4DB nominal.

Two military-type connectors at rear, allow other QM-8 components to be connected if used. When QM-8 mixer is used as a separate unit, a QM-8-PS power supply is needed. The QM-8-MP Monitor System when connected to the QM-8 mixer provides VU meters, submaster and master gain controls to the 4 busses of the QM-8, as well as power for all units.

A monitor master level control is included. The monitor output appears on the front panel at the two stereo phone jacks, and on the rear at the two phono jacks.

For More Details Circle (53) on Reply Card

Recording Equipment Maintenance Manual

Nortronics Company, Inc., has announced a revised and expanded edition of their 'Recording Equipment Maintenance Manual'.

The new second edition contains 28-pages which describe the importance of regular preventive maintenance to preserve listening quality and extend the operational life of real-to-real, cassette and cartridge recorder/players. Factors such as

spacing loss, gap damage due to accumulated dust and dirt particles and other quality and life reducing factors are discussed in detail.

The updated maintenance manual also describes Nortronics LOOK-TOUCH-LISTEN program for determining the condition of recording equipment and features sections describing head demagnetization, splicing and splicing tapes, lubrication, capstan and pinch roller maintenance, liquid and spray cleaners and a typical recorder maintenance program.

Nortronics has compiled the basic information contained in their 'Recording Equipment Maintenance Manual' after many years of depth experience in the design and manufacture of audio and digital recording heads plus extensive research with recorder/players. The QM-SERIES quality maintenance accessories described are, themselves, a direct result of continuing investigations into the causes of recorder quality loss and shortened life—products specifically engineered to prevent machine shortcomings by inexpensive, regular maintenance which **any** recorder owner may perform.

To obtain your copy of the revised 'RECORDING EQUIPMENT MAINTENANCE MANUAL', request one from Nortronics Company, Inc., 6140 Wayzata Boulevard, Minneapolis, Minnesota 55416.

For More Details Circle (54) on Reply Card

Mic-Headset Combination

Telex is now offering a professional headphone-microphone combination for live broadcasting, (fixed station or remote). The new CS-90 has been dubbed the Sportscaster headset because of the large number of applications expected to be found in the area of professional sports announcing.

The wide range, dynamic boom microphone allows hands-free operation and has an exclusive non-metallic diaphragm which withstands high humidity, temperature extremes, corrosive effects of salt air and even severe mechanical shocks.

The microphone is said to offer exceptional low frequency response, and crisp, clear voice transmission. Its omni-directional design picks up background sound which adds color to the broadcast.

The headset is supplied with an in-line "push to cough" switch

(Continued on page 50)

"... And, on behalf of our cheerful staff, a pleasant evening to you!"

(Continued from page 49)

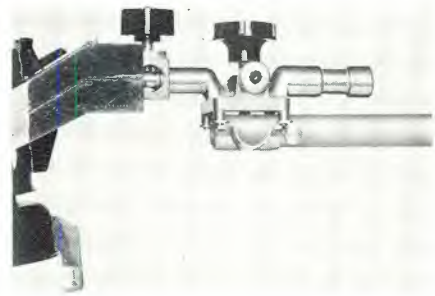
which mutes the microphone when pressed. The switch is located 30 inches from the headset, and can be locked in an off position and has a cord clothing clip to reduce direct pull on the headset.

The headphone features exclusive Telex audiometric type transducers which are unaffected by temperature and humidity changes for consistent performance indoors and out.

For More Details Circle (55) on Reply Card

Camera Stand Adapter

Berkey Colortran, Inc., a division of Berkey Photo, Inc., has an answer for you. Adaptall is a device that will fit any stand tip, ⅜ inch to ⅝ inch. It will permit mounting of lighting fixtures with ⅜ inch to ⅝ inch yoke mounts. Colortran's Adaptall will handle most any camera since it also has a ¼-20 thread screw mount. Priced at $5.95, it should be an asset to your lighting kit.



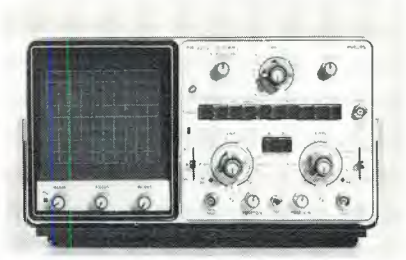
For More Details Circle (56) on Reply Card

Dual-Beam Oscilloscope

Sensitivity of 2 mV/cm across the full 10 MHz bandwidth, plus true dual beam operation are the major advances in the design of the PM3232, a new general purpose oscilloscope by N. V. Philips of Holland. The new instrument is available in the United States from Test & Measuring Instruments Inc., of Hicksville, New York, a wholly owned subsidiary of the **North American Philips Corporation.**

The new instrument is offered at approximately $900 as the successor to the widely used Philips PM3230 for a wide variety of applications in industrial electronics including telecommunications, television, education, computers and peripherals, and electronic maintenance.

The PM3232 combines a number of features that can often eliminate the need for a more expensive, higher bandwidth instrument when only one or two individual features, such as 2 mV sensitivity across a wide band or DC triggering, are required for a particular application. In addition to being a true dual beam instrument and therefore having no possibility of phase displacement between the two traces, the PM3232 also offers universal triggering facilities including automatic level, DC coupling, and automatic TV line/frame selection. Its sensitivity is 2 mV/cm everywhere in the 10 MHz bandwidth of the instrument. The newly designed Philips CRT has a large 8 by 10 cm screen and excellent light output derived from the post-deflection acceleration system so that even low duty-cycle, fast-sweep signals are displayed clearly.



There are two major advantages to dual beam oscilloscopes as opposed to dual trace instruments: First, because waveforms are not chopped or switched they are brighter and there are no discontinuities; second, because there is no possibility of phase-relationship error, dual beam instruments like the PM3232 are especially useful in digital pulse work, in switching exchanges, and in numerical control applications as well as in other fields in which time relationships between waveforms are critical.

The PM3232 has an advanced, compact design and is especially easy to use as compared to other dual beam oscilloscopes because of the human-engineered layout of the

front panel and the reduced number of controls required for operation.

For More Details Circle (57) on Reply Card

Microphones

The addition of three new popular priced microphones and the introduction of one of the most complete lines of microphone stands to the University Sound line, is announced by the **Altec Division** of **Altec Corporation,** Anaheim, California.

1655 1656 1656G

The University Model 1656 cardioid dynamic microphone is ideally suited for live performances, broadcast and recording as well as general public address usage. The pressure unit is fully shock mounted and has a frequency response from 60 to 15,000 Hz. An on-off switch is built in the handle, and the unit mounts on a swivel stand adapter which is supplied.

The University Model 1656G cardioid dynamic microphone is designed for paging, cueing or talkback from control stations. It has a frequency response from 60 to 15,000 Hz and is internally threaded for mounting on a flexible gooseneck stand.

The University Model 1655 is a professional dynamic microphone with omni-directional pattern designed especially for outdoor remote interviews, news and sportcasters, and in television and radio stations. It has a frequency response from 50 to 15,000 Hz.

All three microphones have a matte nickel finish with rugged swedged steel cases and shock mounted elements to withstand the most severe usage. Each has a built in wind-pop filter to eliminate breath pop and outdoor wind noise. All three microphones are built to allow easy field servicing when required.

Television transmitting and receiving equipment needed to establish the nation's first closed-circuit specialized common carrier systems has been ordered from Varian Micro-Link by Microband Corporation of America and Taft Broadcasting Corporation.

Both these companies have recently received construction permits from the Federal Communications Commision (FCC) for installation of Multipoint Distribution Service systems. The Microband installation is authorized for Washington, D.C. Taft Broadcasting will be providing service in Houston, Texas.

Delivery of the Varian Micro-Link equipment is scheduled for January 1973 and completion of these first systems is expected by March.

Multipoint Distribution Service (MDS) represents an entirely new communications medium that was made possible by a Memorandum Opinion and Order requested by Varian and issued in July of 1970 by the FCC. This ruling permits common carriers to use up to 10 megahertz in the 2150-2160 megahertz portion of the spectrum for the omnidirectional relay of television and other signals. Operators of MDS systems will offer a low-cost, real-time television delivery system for private use by industrial, institutional, governmental, and educational users.

The new service will also be able to provide low cost data and facsimile transmission.

For More Details Circle (58) on Reply Card

Routing Switcher

An all new video router with a new standard of performance is now being shipped by **Viscount Video Systems Ltd.** The switcher is designed for routing required by broadcast and telephone companies to switch television transmissions around studios or around cities. With crosstalk more than 70 dB down at 3.58 MHz and frequency response ±.5 dB from 30 Hz to 10 MHz; differential gain and phase 0.5% and 0.4° respectively as examples, this model has top class performance.

(Continued on page 52)

The ten-input ten-output basic switching module occupies only 5¼ inches of rack space, and includes input and output connectors and amplifiers, crosspoints, BCD control logic and power regulation.

All circuits are mounted on plug-in cards and are accessible from the front.

An eleventh crosspoint is mounted on each card to enable the number of inputs to be expanded without requiring a re-entry rack.

Control and display options are the same as have already been supplied on previous systems; direct switching, preselect or salvo switching or computer control. Display could be illuminated push buttons, solid-state digital read-out or as illustrated, plain language display.

For More Details Circle (59) on Reply Card

Low Power Transmitter

Sparta Electronic Corporation is marketing a new partially solid state 50 Watt broadcast transmitter, the Model 720B. It employs high level modulation in any frequency from 540 to 1700 KC, and is normally supplied pre-tuned to the desired frequency.

The 720B answers the needs of many low-power broadcast services; as carrier current transmitter (using AC mains as antenna), test site transmitter for conductivity measurements, etc. The output coupling will match a wide range of impedances so that installation can be made without recourse to sophisticated test equipment normally used in antenna matching.

RF generation begins at four times the carrier frequency, at a frequency range in which quartz crystals are more stable. The division by four into output frequency is accomplished with two astable multivibrator integrated circuits. Specifications include: Frequency Stability ±5 cps, Frequency Response ±2 dB(0-95 percent modulation, 50-10KHz), Distortion less than 3 percent, Noise Level -50

dB, Efficiency 65 percent. In the optional cabinet pictured dimensions are 15⅝"H, 20⅞"W., 23⅛"D. No product guide is yet available for the Model 720B, but information can be had from Transmitter Products Manager Paul Gregg on an individual inquiry basis. The company address is: 5851 Florin-Perkins Rd., Sacramento, Ca., 95828.

For More Details Circle (60) on Reply Card

New Products
Begin on Page 48

AM-FM Pulse Signal Generator

Logimetrics Instrument Is First To Offer FM, AM And Pulse in UHF/VHF Frequency Range.

A new signal generator by **Logimetrics** in the 9.5 MHz to 520 MHz range offers AM, FM and pulse modulation.

The new instrument also features a 5-digit frequency readout LED display on the front panel. It is the lowest priced generator of its type to offer this display.

The FM, which can be used independently or with the AM or pulse modulation provides calibrated deviation of 10 kHz, 30 kHz, 100 kHz or 300 kHz. Deviation is read directly from a meter on the front panel, eliminating the need for additional instruments or time-consuming calculations. Distortion is less than 0.5 percent (at 75 kHz deviation).

Cartridge Carousel

Fidelipac announces their new Cart-A-Round Wall or carousel cartridge storage racks available in the following configurations:

WR-25—the basic module cartridge rack. Made of chrome plated welded steel, the WR-25 comes complete with wall mounting bracket. Holds 25 Type A Cartridges.

MRB-1—Mobile Base. Constructed of heavy-duty black japanned steel on large swivel casters, the MRB-1 will accommodate up to 8 WR-25 modules for a total capacity of 200 Type A Cartridges. Adjustable height from 51″ to 61″.

MR-200—a combination of the MRB-1 Mobile Base and 8 WR-25 modules. The WR-25 modules can be easily removed for wall mounting (hardware not included).

TECHNICAL DATA

For further information, circle data identification number on reader service card.

100. AEL COMM. CORP.—The new "AELCC Tunerless Converter" brochure presents AELCC's single output and dual output tunerless "block" converters for Mid-Band and Super-Band ranges. The converters feature flexibility and low operating cost; each adds seven channels and together they can provide up to 14 additional channels on existing cable. The four-page brochure also contains charts and block diagrams.

101. B & K INSTRUMENTS, INC.—A new 16-page brochure "Sound Level Meters" is now available from B & K. It describes their full line of special sound level meters to measure noise and vibration under laboratory and field conditions.

102. CHERRY ELECTRICAL PRODS. CORP.—A new 72-page catalog contains complete listings, engineering drawings, specifications, operating characteristics, and technical data on switches and keyboards. Included in the catalog are Snap-action switches, Leverwheel/thumbwheel switches, keyboard switches, matrix selector switches and keyboards.

103. ELECTRONIC ENG. CO. OF CALIF.—Uses, advantages and format of the New SMPTE Edit Code are covered in a new 12-page booklet. Simple sketches and diagrams make the basics of the code easy to understand even for new-comers to digital electronic techniques.

104. GENERAL ELECTRIC CO.—Three General Electric lighting reference guides widely used by the television, motion picture, and theater lighting industries have been combined into a single, easier-to-use publication. The new "Stage/Studio Lamp and Equipment Directory" simplifies the identification, application and ordering of Quartzline™ and other incandescent lamps most frequently used in lighting theater stages, television and motion picture production, and professional photography studios. In addition to lamps, the new booklet lists more than 1,200 lighting fixtures in a "fixture relamping guide", and includes ANSI cross-references matching ANSI code with equivalent GE lamp or replacement.

105. GTE SYLVANIA INC.—A new catalog describing GTE's line of studio, theater, and television

lamps is now available. The new catalog, STTV-108, includes operating information on tungsten-halogen, incandescent, and arc-discharge lamps and a substitution guide for reference when incandescent light sources are to be replaced by tungsten-halogen lamps.

106. HEWLETT PACKARD CO.—Diodes and high-frequency transistors available from Hewlett-Packard are described in a new eight-page short-form catalog. Listings include the company's line of Schottky, PIN, IMPATT and Step Recovery diodes. Chip, beam lead and other configurations for use in hybrid integrated circuit applications are shown. Hewlett-Packard's series of high-frequency transistors are listed along with their gain, noise figure and power output curves.

107. INTERDESIGN INC.—A new eight-page brochure describing the Monochip is now available. The brochure explains this unique custom IC approach and gives detailed technical and price information. The Monochip, pioneered by Interdesign, lowers production cost for almost all electronic assemblies by replacing most or all discrete components and standard IC's with a single monolithic custom chip.

108. JENSEN TOOLS AND ALLOYS—"Tools for Electronic Assembly and Precision Mechanics" is a new 96-page handbook that will be of particular interest to electronic technicians, engineers, scientists, and instrument mechanics working on fine assemblies. Over 1900 individual items are offered and described in the new catalog. Section headings include Screwdrivers, Wrenches, Pliers, Tweezers, Files, Shears, Knives, Microtools, Relay Tools, Tool Kits, Power Tools, Metalworking Tools, Wire Strippers, and Soldering Equipment. An Expanded Tool Kit section features kits for field engineers, service engineers, assembly technicians, students and kit builders.

109. MOTOROLA—Motorola's "MECL Data Book" is a fact book and a design guide wrapped in one cover. Basic performance specifications are provided for

(Continued on page 56)

(Continued from page 42)

each IC device in the MECL II, MECL III, and MECL 10,000 logic families. In 410-pages, complete DC, AC, and performance data are given for each MECL product announced up to press-time. Convenient abbreviated guides offer a quick selector for MECL logic blocks. In the 36-page general information section is contained a synoptic discussion of topics of value to the designer planning MECL system: product performance data, design rules, system considerations, etc. In addition, dimensioned drawings of MECL IC packages are shown.

122. MAGNAVOX—New literature from The Magnavox Co., CATV Division describes their 2900 Series modular overhead directional taps. Key features, illustrations and complete specifications are given for the 5 to 300 MHz lines. Included are six two-output units in values of from 7 to 25 dB; six four-output units in values of from 10 to 29 dB; and two terminated versions, one each for two and four outputs. Outstanding performance is boasted.

Call him at 328-9084 for further information.

Chapter 28—Milwaukee, Wisconsin
Chairman: Ed Wille, KenCom
7835 W. Caldwell St., Milwaukee, Wisconsin 53218

Plumbicon Camera Tubes was the topic covered by Peter Birnstein, manager, Commercial Engineering, and Ralph Johnson, Central Region Sales Manager, of Amperex Electronics at Radio City Auditorium, WTMJ, on November 14th. The technical session was preceded by dinner at Eastbrook Inc., as usual. The preceding meeting was held on October 24th at Taylor Electric, Mequon, Wisconsin, where 35 members and 5 guests demonstrations and discussions by Paul Farigan and Hank Skawinski, field application engineers, National Semiconductor Co., Santa Ana, Calif., on integrated circuits among which were included a one-chip sync generator for camera or master sync-pulse generation.

Also discussed were a clock consisting of one IC which has a variety of features and a minimum of external components, and unusually versatile voltage regulators, plus preamps, op amps, and oscillators.

(Editor's Note: Special congratulations are due the entire membership of Chapter 28 for the all-out manner in which meetings are planned and conducted, and for their publication, **The Broadcaster** which not only lists upcoming meetings and events, but also completely reviews the previous meetings, contains extensive editorial comment, and now includes a regular technical article by Burt Boettcher, a registered PE, and an audio consulting engineer. Boettcher's first article was on Noise Measurements. Todd Boettcher is editor of **The Broadcaster;** Todd recently wrote to Hartford Gunn, president of the Public Broadcasting Service, concerning Gunn's proposal on improvement of television program audio. A reply from the PBS president was included in the November issue.) □

PROFESSIONAL SERVICES

ADVERTISERS' INDEX

CLASSIFIED

Advertising rates in Classified Section are 15c per word, each insertion, and must be accompanied by cash to insure publication.

Each initial or abbreviation counts a full word. Upper case words, 30c each.

Minimum classified charge, $2.00.

For ads on which replies are sent to us for forwarding, there is an additional charge of $2.00 to cover department number, etc., which is printed in advertising copy, and processing of replies.

Classified columns are not open to advertising of any products regularly produced by manufacturers unless used and no longer owned by the manufacturer or a distributor.

TRAINING

PASS FCC EXAMS with Ameco books. Each book contains FCC questions plus simplified answers plus FCC-type exams and answers. 3rd class 75c, 2nd class $2.25, 1st class $1.50. Free catalog. Ameco Publishing, 314G Hillside Ave., Williston Park, N. Y. 11596. 8-72-tf

FIRST PHONE through tape recorded lessons at home plus one week personal instruction in Washington, DC, Atlanta, Boston, Detroit, New Orleans, Minneapolis, Seattle, Denver, Portland, Los Angeles. Proven results. Our 17th year teaching FCC license courses. Bob Johnson Radio License Preparation, 1060D Duncan, Manhattan Beach, Calif. 80266. Phone 213-379-4461. 1-69-tf

PASS FCC first and second class exams with new 21 lesson, 450-page course. Starts with basic electricity. Over 600 FCC-type, multiple-choice questions and sample exams included. No previous technical knowledge required. Commercial Radio Operator Theory Course, #15-01. Only $5.95. Ameco Publishing, 314G Hillside Ave., Williston Park, N.Y. 11596. 8-72-tf

EARN ELECTRONICS DEGREE, mainly by correspondence. F.C.C. license preparation included at your option. Accredited by Accrediting Commission of NHSC. G.I. Bill approved. Free brochure. Write: Dean, Grantham School of Engineering, 1505 N. Western, Hollywood, California 90027. 8-72-tf

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FOR DESIGN OF ONE AND THREE TUBE COLOR TELEVISION CAMERAS.

EE or Physics Degree required. MS preferred. Three-ten years direct experience a must.

Cohu's modern facility is 15 minutes from bay and ocean, 50 minutes from mountains. Excellent Health/Life Insurance. Profit Sharing Retirement Program. Five institutions provide excellent graduate study opportunities.

Call (collect) or write, (resume') Jim Barnes, Chief Engineer, to arrange a personal interview. COHU INC., Box 623, San Diego, CA 92112. Phone 714-277-6700. An Equal Opportunity Employer.

HELP WANTED CONT.

JOB HEADQUARTERS for all Radio and Television Engineers. Immediate openings exist in 9 western states and elsewhere for qualified engineer and technical personnel. All categories from trainees to experienced transmitter maintenance, chief, assistant chief, live color video maintenance and technical operations. Send us your complete resume now. The AMPS Agency, 11661 San Vicente Blvd., Suite 300, Los Angeles, Calif. 90049. Telephone: 213-820-2678. By Broadcasters—For Broadcasters. 11-68-tf

STAFF ENGINEER Experienced in design and construction of television broadcast systems, including studio and transmitter equipment. Send resume to Chief Engineer, S.C. Educational Television Center, Drawer L, Columbia, S.C. 29250. An Equal Opportunity Employer. 1-73-1t

NEEDED IMMEDIATELY: systems techs with at least 5 years experience with 1200's, TR-70's, AVR-1's cameras (broadcast color) HS-100's and 200's, in Chicago area. Positions are with an international production house. Full benefits and salary commensurate with experience. Please send resumes to: Editel Productions Incorporated, 1920 North Lincoln Avenue, Chicago, Illinois 60614. 1-73-1t

CHIEF ENGINEER for established major Deep-South 5KW AM, 100 KW Stereo FM. Exceptional opportunity for a young, Sound Specialist with a super-sensitive ear for top quality audio. Facilities include brand new studios. Excellent fringe benefits, including a house. Salary commensurate with ability. Send resume and picture including references to: Dept. 274, Broadcast Engineering, 1014 Wyandotte St., Kansas City, Mo. 64105. 1-73-2t

WANTED

WANT to buy used RCA TK-60 Monochrome Cameras. Call (801) 487-5399 ext. 341. 1-73-1t

AMPEX 1200 VTR from Owner Reply to D. ZULLI (213) 466-7757. 1-73-1t

DESIGN ENGINEER TV Broadcast Design Engineer, BSEE or equivalent. Five years experience—all phases network broadcasting. Digital design also required. Send resume to: Public Broadcasting Service 485 L' Enfant Plaza, West, S.W. Washington, D.C. 20024 Att: Mr. R. D. McCormick. 1-73-1t

WANTED: All surpluss broadcast equipment especially clean A.M. & F.M. transmitters, contractors, capacitors. Surpluss Equipment Sales, 2 Thorncliffe Pk. Dr. Unit 28 Toronto 17, Ont; Canada. 1-73-tf

SERVICES

CRYSTAL & MONITOR SERVICE. Frequency change, repair or replacement of oven type broadcast crystals. Also frequency change and recalibration or repair of AM frequency monitors, and H-P FM monitors. Fast service at reasonable prices. 30 years experience! Call or write: Eidson Electronic Co. Box 96, Temple, Tx. 76501. Pho. 817 773-3901. 9-70-tf

CARTRIDGE RELOADING. Send us your worn cartridges for reconditioning. Carts cleaned, new pressure pads installed, and minor parts replaced. Tops replaced at manufacturers cost. 48 hour service. Competitive prices. New cartridges also available. Call or write: Marlin Cartridge Co., 195 Prentis Ave., Drew, Miss. 38737 (601) 745-8380 11-72-6t

CARTRIDGES RECONDITIONED—NEW TAPE 12 years experienced personnel, Fidelipac Tapex, Audiopak cartridges. Write for new and reconditioned price sheet. Mastertone Company, 1105 Maple; West Des Moines, Iowa 50265. 1-73-1t

TOWER FABRICATION, erection and painting, Antenna and Electrical work our specialty. Security Tank & Tower Corp., P. O. Box 913, Henderson, Kentucky 42420 (502) 827-2509. 1-73-6t

EQUIPMENT FOR SALE

FIDELIPAC Cartridges, FACTORY Loaded. New and Used SPOTMASTER cartridge machines, accessories, and parts. Many other equipment lines. Contact COMMUNICATION MEDIAS Box 54, Allentown, Penna. 18105 215-437-0607. Consult our other ads in this magazine. 11-72-2t (e.o.m.)

HELIAX-STYROFLEX. Large stock—bargain prices—tested and certified. Write for price and stock lists. Sierra Western Electric, Box 23872, Oakland, Calif. 94623. Telephone (415) 832-3527. 1-73-tf

VHF SWEEP GENERATOR, Texscan LS-40 with SA-50 atten, 1 MHZ and 10 MHZ harmonic markers. Ideal for translators with VHF input of FN transmitters. Solid state, 8 lbs. Perfect condition. $500. Don Masters, P.E. P.O. Box 16 North Sandwich, N.H. 03259 (603) 284-6400. 1-73-1t

BUILD YOUR OWN TV AND RADIO PRODUCTION EQUIPMENT. Easy, inexpensive, (mostly IC). Plans or kits: Special Effects Generator, Automatic Logger, Vertical Interval Video Switcher, Solid State Lighting Board, Preset Audio-Video Board, Preset Lighting Board, Crystal Controlled Wireless Mikes with matching receivers, Subsonic Tone Control for audio tapes, 8MM SOF Cameras and Projectors, Distribution Amplifiers (Sync, Video, Audio), Audio Control Boards (Studio & Remote) Proc-Amp with compensation and regeneration for adapting Helical Scan VTR's to broadcast standards. PLUS specialized correspondence courses in Telephone Engineering ($39.50), and Integrated Circuit Engineering ($49.50). Plans from $5.95 to $15. SUPER CATALOG plus years updateing of new devices Air Mailed $1.00. Don Britton Enterprises, PO Drawer G, Waikiki, Ha. 96815. 1-73-4t

"TWO RCA TK-42 color camera chains complete with auxiliary electronics and controls. $15,000.00 each. E. Newton Wray, General Manager, KTBS-TV, Shreveport, La. 71104. Telephone 318-868-3644." 1-73-3t

CAROUSELS. Like new. Completely rebuilt, tested, and guaranteed. Limited supply. $995.00 ea. AUTODYNE, P.O. Box 1004, Rockville, Maryland 20850 Phone: (301) 762-7626. 1-73-1t

FOR SALE: 2 PC-70's complete color camera chain, 3 years old. Best offer. Box No. Dept. 273. Broadcast Engineering, 1014 Wyandotte St., K.C. Mo. 64105. 1-73-1t

AMPEX 7500 Color Video Tape Recorder—mint condition—complete. $1,200.00. Stan Nazimek, Jr., 506 Mount Prospect Avenue; Clifton, New Jersey 07012. 1-73-2t

LAKESIDE INDUSTRIES Picture Tube Rebuilding Unit. Bx. 973 Vista, Ca. 92083. 1-73-1t

SURPLUS AUDIO PATCH PANELS, All Standard Configurations. Gulf Telephone & Electronics, Inc., 6325 Beverly Hill, Houston, Texas 77027 7-72-tf

COMPLETE COLOR TV STUDIO FOR SALE. Used only thirty hours. Sacrifice at half price. Comprising: 1—RCA PK 730A color camera with Kikkor 6-1 zoom, encoder, remote control panel and cables; 1—RCA 800 Color 1" VTR M1591182; 1—RCA PTS-1 10/A switcher, 10 input; 1—RCA PSG-2 EIA sync. generator; 1—Tektronix R520 vectorscope; 1—Tektronix R140NTSC signal generator; 1—Tektronix RM 529 waveform monitor. Plus another hundred items all at distress prices. Write for list. Phone (201) 245-8000 or write David Butz at New Jersey Communications Corp., Kenilworth, New Jersey 07033. 1-73-1t

"NEW & USED TOWERS, Buy, Sell or Trade, Erect. Ground wire 85c lb. Bill Angle, 919-752-3040, Box 55, Greenville, N.C. 27834." 2-71-tf

FAIRCHILD 663 LIMITERS -five available at $100.00 each Fairchild Model 675 Dynamic De-esser - one available at $100.00 ACCURATE SOUND CORPORATION, P. O. Box 2159, Garland, Texas 75041 (214) 278-0553. 12-72-4t

Standard RCA Style VIDEO PATCH JACKS unused $1.75 each. You supply panels and save. Norman Gillaspie, P.O. Box 2124, Monterey, Calif. 93940. 1-408-375-7424 11-72-3t

EQUIPMENT FOR SALE CONT.

ONE STOP for all your professional audio requirements. Bottom line oriented. F. T. C. Brewer Company, P.O. Box 8057, Pensacola, Florida 32505. 7-71-tf

AMPEX PARTS, head stacks and head assemblies, complete inventory - write for price quotation. ACCURATE SOUND CORPORATION, P.O. Box 2159, Garland, Texas 75041. (214) 278-0553. 12-72-4t.

AMPEX spare parts, technical support, updating kits, for discontinued professional audio models, available from VIF International, Box 1555, Mtn. View, Calif. 94040 (408) 739-9740. 9-72-e.o.m

MOTORS FOR SPOTMASTERS
NEW Paps hysteresis synchronous motor HSZ 20.50-4-470D as used in series 400 and 500 machines. Price $39.00 each prepaid, while they last. 90 day warranty. Terms check with order only, no COD's. Not recommended for Tapecaster series 600 or 700
TAPECASTER TCM, INC., Box 662,
Rockville, Maryland 20851
1-72-TF

CARTRIDGE TAPE EQUIPMENT —Rebuilt. New paint, heads, flywheel, pressure roller, belts, etc. Spotlessly clean and thoroughly tested. 30 day money-back guarantee, 90 day warranty. Also contact us for possible discounts on new equipment and accessories. AUTODYNE, Box 1004, Rockville, Maryland 20850, (301/762-7626). 7-72-tf

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MICROWAVE LINKS
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Color TV Microwave Links, C Band. NTSC Color TV Plus Program Audio. CATV/Studio Xmtr/Remote uses Raytheon. As new also Collins MW-103 Components in stock. $950 per rack W/4 CH MUX.

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RADIO RESEARCH INSTRUMENT CO., INC.
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(203) 853-2600

CORRECTION NOTICE:
The telephone number in the above ad for Radio Research Instrument Co. is **now correct.** The phone number appeared incorrectly in previous insertions of this ad. The staff at Broadcast Engineering apologizes for this error.

For More Details Circle (2) on Reply Card ⟶

NEW ANTENNA FOR CARS BAND

ndrew has developed a new series of economical and rsatile antenna systems for use in CARS band local stribution systems. An optional rear mounted enosure allows mounting of radio equipment directly the antenna or on the tower. When mounted on e back side of the reflector, the complete RF sembly, including feed can be readily removed for aintenance without disturbing antenna path alignment. These LDS antennas offer the best value available for reliable local distribution of CATV by microwave.

For further information write for Bulletin 1051A or contact your Andrew Sales Engineer.

ANDREW

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ANDREW ANTENNA SYSTEMS Lochgelly, Fife, Great Britain KY5 9HG

ANDREW ANTENNAS 171 Henty St., Reservoir, Victoria, Australia 3073

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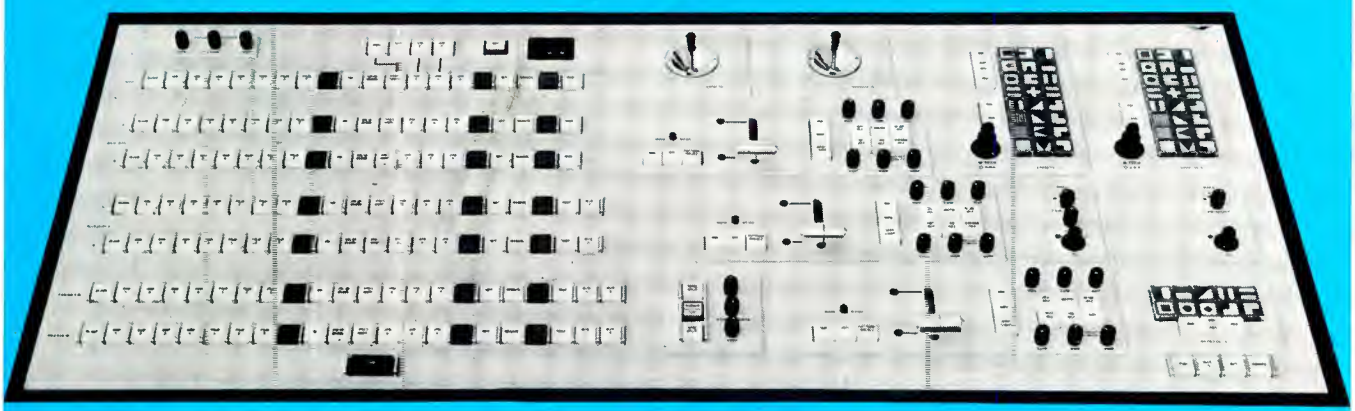

VIX-100-4

Drift-free circu try makes it possible to enjoy three mix-effects system with quad-split in a control panel no larger than most single mix-effects switchers. Discover the advantages of a switching system that satisfies ad agencies and insures dominar ce in production capabilities.

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