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**NAB convention
roundup** page 42

**National Radio Month
Audio Installation
TV Election Reporting**



The Good Old Days of Radio...

Listen to the radio stations in your area any day of the week and the chances are you will find at least one presenting a program devoted to recordings of the Big Bands of the heyday of radio, that period preceding and including World War II when most of the performances were live. Audiences and sponsors alike are finding these programs interesting and the response from both groups has been enthusiastic.

Recording companies are offering re-issues of the original material and in some cases, modern versions for better sound. They are all evidence of a revival of interest in the period when radio was the dominant entertainment medium. Those were the days of the big names, bands, singers and comedians.

At the local level, many stations had a staff orchestra, some for playing jazz, others for symphonic programs. A few stations had their own dramatic groups. They all had their following of loyal fans who wouldn't miss a performance.

*Director of Engineering, WTIC-AM-FM-TV, Hartford, Conn. Pictures through courtesy of WTIC and NBC.

Those were the days that brought radio to its peak in terms of audience size and popularity. But what about the technical facilities—were they of the same outstanding caliber as the artists and programs? A comparison with today's equipment may be surprising.

The major difference between the station of the 1930's and one of today would be found in the studios. Nearly every station had several studios of varying sizes. In New York and Hollywood the networks used theatres for programs presented before audiences. Use of acoustical treatment was generous and the studios would be considered "dead" by today's standards with little, if any, reverberation. No attempt was made to add synthetic reverberation, as might be done today, because it wasn't the sound wanted. Even recordings of the pre-war period were made without it.

The Control Room

The pre-war control room would be a surprise. Since quantity-produced consoles of stock design did not appear until the very late '30's,

each station assembled its own facilities in terms of its requirements. Mixers were put together from individual faders, sometimes without regard to impedance matching rules. Amplifiers were stock items consisting of several basic types. Monitor loudspeakers were usually of the electro-dynamic or field coil type with the field coil sometimes connected as a choke in the power supply. Flat baffles were a favorite form of mounting the speakers because they could be hung over the window facing the studio. Performance left a lot to be desired.

The standard volume indicator or "VU" meter was adopted by the industry in 1939. Prior to that time many different instruments were used although the Western Electric 203-C and the RCA counterpart were the most popular. These were vacuum-tube voltmeters adjusted to read power levels when operated across a standard impedance. The useful portion of the meter scale was less than half of full scale. Ballistic characteristics were far from standard and the fact that they

Fibber McGee and **Molly** liven up their audience in this production back in 1939. Were these really the "good old days"?

Steve Lawrence sings during a broadcast of the current NBC Radio "Monitor" program origination. The modern format makes demands that equipment from the "good old days" never could have met.



Or Were They?

By Harold A. Dorschug*

contained a half-wave rectifier made the response dependent on the symmetry of the waveform. Many operators preferred certain pieces of equipment because they liked the action it contained, but this did not mean that its performance was necessarily correct. As can be expected, levels were erratic and transmitter modulation varied accordingly.

Microphones

Today's sound man would feel somewhat frustrated at the choice of microphones available to him in that earlier day. The mainstay of the studios was the ribbon or velocity developed by RCA and exemplified by the famous 44 series. This was an excellent microphone and its directional characteristics made it very useful in cutting out unwanted sounds from the sides. Its size and vulnerability to wind limited its use mainly to inside pickups.

Condenser microphones were actually an early development and were used to some extent in the early '30's. However, compared with today's versions, they were large, heavy and prone to create

noise under humid conditions. Dynamic microphones also enjoyed popularity, chiefly for remotes because of their ruggedness. They were basically unidirectional in polar response.

For many years, phonograph records were frowned upon for actual broadcast use, due in part to questions related to license and royalty matters. The main source of recorded music was transcription libraries. These were services leased to stations and consisted of 16-inch discs. Some utilized a vertical cut or "hill and dale," while others had a laterally modulated groove similar to today's discs. Turntables had to be large to accommodate discs of this size and they were also heavy for speed stability. As a consequence, starting was usually slow. The tightly paced format so common today, would have been impossible to produce.

Heavyweight Remotes

Remote amplifiers were backbreakers in the literal sense. Weights of 35 to 50 pounds were common until just before the War. Add to

this several microphones and stands, cables and headphones and you can see why only the bravest liked to do remotes.

The use of radio relays was limited to frequencies between 1.6 and about 3 MHz. This required relatively long antennas even when loaded with inductances which were difficult to mount. Skywave effects also occurred and frequently caused interference. Since AM was the only method used, the circuits were highly susceptible to noise.

These were the facilities that were used to give radio the greatness of its Golden Age—an expression so often heard these days. But what about radio today—Radio of the '70's with the biggest audience ever and more hours of broadcasting from more stations than ever existed before?

Modern Radio

Radio today is more efficient, more closely attuned to its audience and capable of doing a job not dreamed of in the pre-war days. Let's look at what the facilities in use today are like.

Studios are smaller. Talk programs have replaced live musicians and the facilities are arranged accordingly. Mikes are available with characteristics to match voices and patterns to minimize studio problems. Response is more uniform and satisfying.

Control rooms are a far cry from yesterday. Highly efficient consoles combine all necessary functions in space-saving arrangements and offer performance found only in the laboratory during the "Golden Age." The volume indicators with their longer scales and full-wave rectifiers permit level control of a high degree. Automatic gain adjusting amplifiers and limiters with fast attack time and reliable control permit high average modulation levels to be maintained with better service to the listener, particularly the mobile audience.

Turntables are smaller and faster in operation, resulting in a faster paced operation. Pickup arms and cartridges provide outstanding performance and permit maximum realization of recording quality. Recordings are smaller and storage easier.

The most outstanding development of the post-war period, aside from solid-state technology, has been the use of magnetic tape. When this invention was discovered in Germany by the armed forces during the war and later brought to this country, it opened up a new era in recording. Its use in cartridge form further extended its usefulness and we are on the threshold of even greater use of cassettes.

In the "Golden Age" stereo existed only as a laboratory toy. Today it exists in practice as evidenced by the daily schedules of hundreds of FM stations and it has given radio a new dimension. A

four-channel version is making its appearance and will probably become commonplace in the not too distant future. Stereo transmission has brought with it a new set of problems such as cross-talk, chan-

nel separation and phasing, and it is a tribute to the broadcast engineers that they have taken these problems in stride.

Remote equipment has been reduced in size so that handling an



Editor's Note: There's one thing that hasn't changed much in radio. And that's radio's participation in serving the public interest during emergencies and disasters. Thanks to those who serve.

outside pickup is no longer fraught with physical hazards. The use of radio replay units is commonplace and today VHF FM equipment is found in many stations. Licensing regulations and procedures may be

relaxed in the near future making possible even greater use.

Whenever the temptation to look back at those good old days occurs, take a look around you. Yes, radio was great in spite of technical limita-

tions and the people who made it worked hard to overcome them. Today we are a long way down the road of progress. There is more to work with and the opportunity to go even further ▲

WTIC Studio D back in the 1940's. Control room is at left, observation room at right. The high ceiling and spaciousness were typical of the large studios of the time.

Engineer Bob Downes looks on as producer **Bill Marks** preps artists **Jean Colbert** and **Ed Anderson**. This WTIC studio is currently the largest of four, yet it is smaller and more compact than the shot of their Studio D back in the 1940's.



Remember the war bond drives? Here **George Bowe** interviews a crewman from a bomber squadron at **Braintree Field, Hartford, Conn.** The remote pickup radio relay equipment was built by the WTIC staff and carried in a panel truck. Ribbon velocity microphones were used in the field only when wind was not a problem.

WTIC newsman Larry DeBeare describes action at a recent **Greater Hartford Open Golf Tournament**. The range and performance of this equipment is far superior to that used in the old days.



TELEVISION ELECTION



Fig. 1 The Foto-Mem Centaur mini-computer . . . at the heart of the WTIC election system.



By Harold A. Dorschug*

To cover the 1970 Connecticut elections, WTIC-TV achieved very outstanding results with several of the most modern display systems. These systems consisted of a computer-controlled character generator programmed to display 19 races and a board comprising "split-flap" graphic numerals arranged in an 8-race conformation. These were used in conjunction with a batch business computer to obtain additional fea-

Editor's Note: The WTIC election coverage described here has been awarded a Special Citation in the Election category of UPI's 15th annual Tom Phillips Awards.

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tures such as high-speed hard copy print-out required by the staff of WTIC AM-FM.

Planning for this operation started early in the year. Regular meetings of the group responsible for the project consisting of representatives of program, production, news, engineering and business were held. The services of Mario W. Conti, consultant from Manhasset, New York, were also available to the group.

It was decided that the primary display system would utilize the station's Videograph Character Generator and the secondary display would involve split-flap units. The reasoning behind this decision was based upon the speed with which the character generator could flash results on the screen when computer driven. Since only one race could

be shown at a time (because only the bottom of the TV screen was to be used) instant call up from the memory bank was necessary.

The split-flap units, on the other hand, operate more slowly but retain their settings until updated and show all race results simultaneously. These factors meant the electronic characters would be used during the actual vote gathering, a hectic period of about one hour, and the large display board would be used for final vote tally during local program periods throughout the remainder of the evening. For this purpose the WTIC boards harmonized well with the CBS network displays with which their appearances were intermixed.

During the early period, these displays would be updated continu-

REPORTING SYSTEM

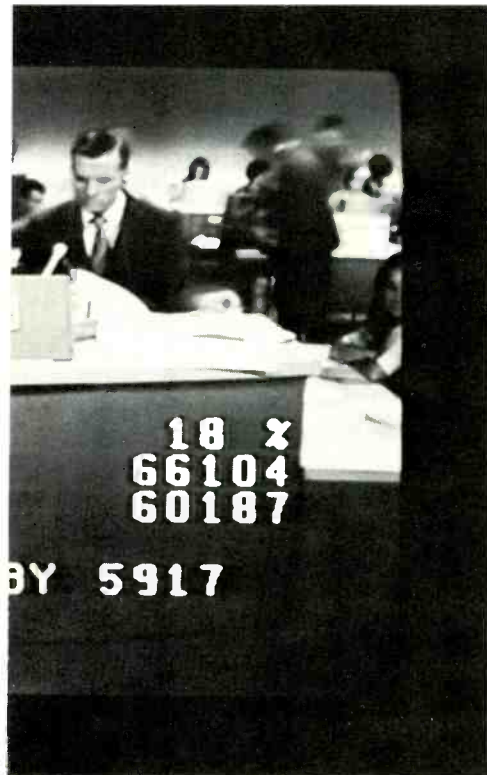


Fig. 2 Monitor display showing results of the race for Governor.

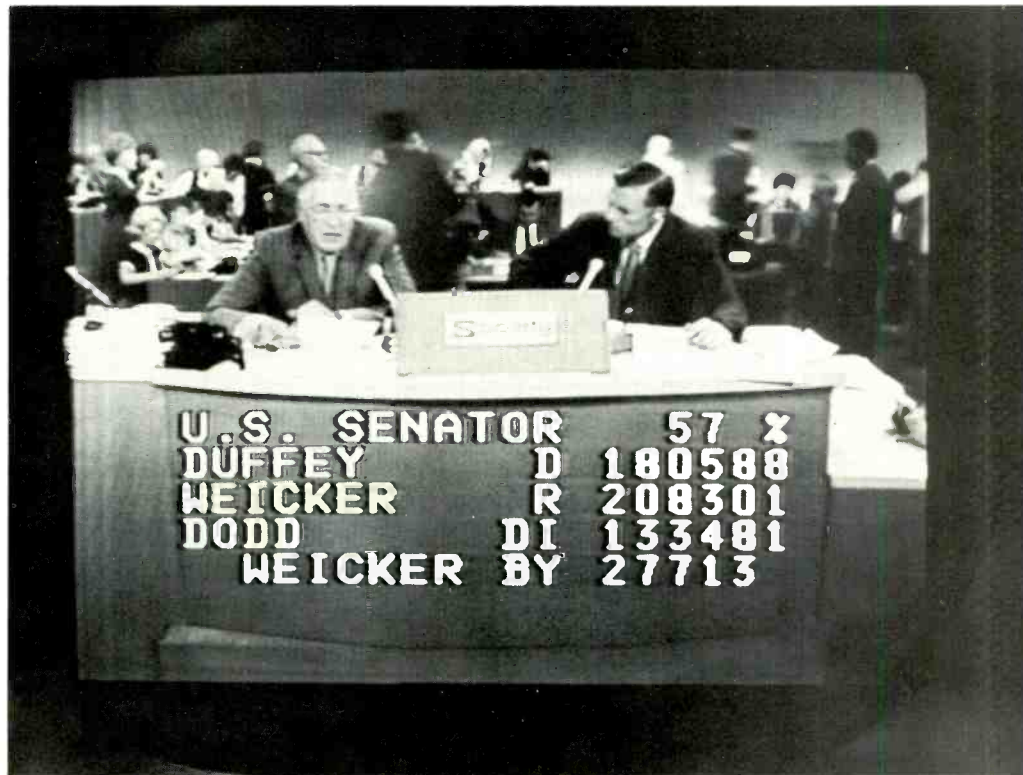


Fig. 3 Monitor displays results of voting on three candidates and spots the winner in the Senatorial contest.

ously and would provide a backup, if necessary, for the electronic system.

Computer Package

An order was placed with Foto-Mem, Inc. of Natick, Massachusetts for one of their Centaur mini-computers complete with an additional memory disc and teletypewriter terminals. A complete software program was also part of the package. H. Malcolm Wilkinson, General Manager, Computer Science Division of Foto-Mem, directed the project including interfacing with WTIC's Videograph Generator.

The system was arranged so that input data were punched into standard teletypewriter tapes which were read into the computer by a standard tape reader. Command

over the output and control of the character generator was by means of a teletypewriter. Figure 1 shows the Centaur computer.

The format of the election displays are shown in Figures 2 and 3. In general, they contained the title of the race, percentage of votes tabulated, up to 3 candidates' names, party affiliation, the current vote for each, plus the name of the leader and his plurality. As you can see, the studio set behind the commentators was arranged with the lower half blank and of a suitable color to produce a panel in which the message could be keyed. Edge enhancement with an Anderson Labs BORDERLINE was very effective.

In Connecticut, at the present time, voting is done in 648 polling places. Each was staffed with a re-

porter who telephoned his results to WTIC as soon as they were available. Consequently, results were based on the actual "raw" vote. Since the 648 polling places are distributed among 169 towns and traditionally the results have been reported from each town as its vote is complete, there was much discussion over reporting towns versus polling places. It was decided that to wait for complete town reports before showing results would slow down the process and the decision to stay with the raw vote is what kept us ahead.

It was, however, felt desirable to present the 169 town votes because of audience interest. The computer was programmed to generate a "roll" containing a format of the leaders in each of the two main

aces, governor and U.S. senator, with the vote. It was planned to use this after statewide results were known but as it turned out, it was delayed too long to be useful (through no fault of the program). This was a most elective presentation which would be impossible without employment of the computer.

The split-flap board is shown in Figure 4. A number of these digital display devices are available on the market. The Mischiatti brand was chosen because it offers several advantages. First, it contains alphanumeric characters and matching units with blank panels of various lengths are also available. Also, the displays are fast and quiet.

After election, other uses were planned, involving letters such as weather reports, sports and similar features. They operate on a 6-bit digital code which makes them a

natural for computer control of interfacing with various computer technology devices.

Using this fact, Mario Conti designed and produced a solid-state control system which anticipates computer operation. This system also resulted in a great reduction and simplification of the inter-connecting cables, providing great flexibility and expanding the combinations of displays available. The units were operated by means of "thumb-wheels" arranged in three groups consisting of a master and two or more slave units. The groups were stacked the same as the display board configuration to simplify data entry. Figure 5 shows this operating position.

Figure 6 is a flow diagram showing how votes were processed from their arrival by telephone to on-the-air pictures. A partial view of the studio portion of the operation is

shown in Figure 7. It required less than four minutes for a telephoned report to be included in the "on-air" display total. A significant part of this time was caused by the fact that the cards had to be carried from the IBM card punches in the first-floor studio to the card reader in the Honeywell computer room on the third floor. However, a pre-election rehearsal revealed that the system as shown was capable of updating the character generator displays faster than the commentators could use them. Consequently during the actual broadcast, Honeywell print-outs were inhibited somewhat to pace the use.

A print-out about every four minutes was adequate. This, of course, would be determined by the number of races involved. Although the computer stored formats for 19 races, only 11 were in continuous use and the remainder were called up only when final votes were available. Fewer races would require a faster print-out. When the vote percentage reached 100 percent, the name of the winner blinked automatically.

While any television station owning a character generator could use it in the manner of WTIC-TV, certain distinct advantages would be lacking without the computer. These are its large memory, instant recall, the ability to accept and process input data in simplified form, and the fact that it will perform arithmetical functions while doing the other things.

Once the program has been written and formats created, the information is prepared according to code, entered and called out. It will do this in random sequence, of course, and if two terminals are employed, both input and output terminals will function at the same time.

Computer Input

Our input code consisted of a "read" instruction (R), a 2-digit address (01), percentage of vote tabulated (001), followed by the vote of each candidate filled out to six digits by dots (. . . 123, . . . 456). Because the Honeywell was doing the basic arithmetic as part of an elaborate analysis, we also chose to enter the name of the leader together with his margin. However, future programs will be written for

Fig. 4 Studio set containing Mischiatti display units. The title of the display and the names of the candidates were part of the overlay.



Fig. 5 Secretaries operating the Mischiatti control units. Each of the triplicate controls will operate any one of the displays.



the Centaur to do this arithmetic and select the leader, automatically. The verifying copy of the girls who punched the tapes for Figure 2 read as follows on the teletypewriter:

R07
 .18
 .66104
 .60187
 DADDAR10.by.5917

Use of "LINE FEED" key after each line entry performed all necessary functions for the computer to enter these data in the correct portion of the format. Choice of the

race to be displayed was made by a similar code using the letter C followed by the address. This would be "C07" for this illustration. Instant execution occurred when the last digit key was depressed. This was handled by a television director who coordinated call-ups with the news director.

System Update

Looking ahead, several modifications to the system are planned. Certainly the Mischiatti units should be connected directly to the Cen-

taur. This will eliminate one point of potential error. Another will be to use cathode ray tube terminals (CRT's) for data input. These devices, offered under the name Foto-Vision by the manufacturer of the Centaur computer, are also available from other sources and widely used in the data processing field for rapid and accurate input and output use.

Appropriate programming, for example, would present the format for the data being entered to the CRT operator and remove some of the mystery of the simplified codes associated with punched tapes. Instant verification of the material would also be possible in somewhat easier fashion than the printer provides. Finally, consideration will be given to the possibility of interfacing the Centaur with the Honeywell. Such a connection would allow continuous input transfer to the Centaur and could result in benefits due to the larger capacity of the Honeywell, including its magnetic tape drives and other peripheral devices.

Elections over, the Centaur was configured for numerous day-to-day uses in news, sports and general programming. Automatic and instant preview of these formats on the Foto-Vision terminal prior to airing will be of great value.

WTIC-TV has realized some of the benefits available from the use of computerized election reporting. The many favorable comments from the audience together with the satisfaction of management are providing the encouragement to move even further ahead to this area.

Fig. 6 WTIC election information flow diagram.

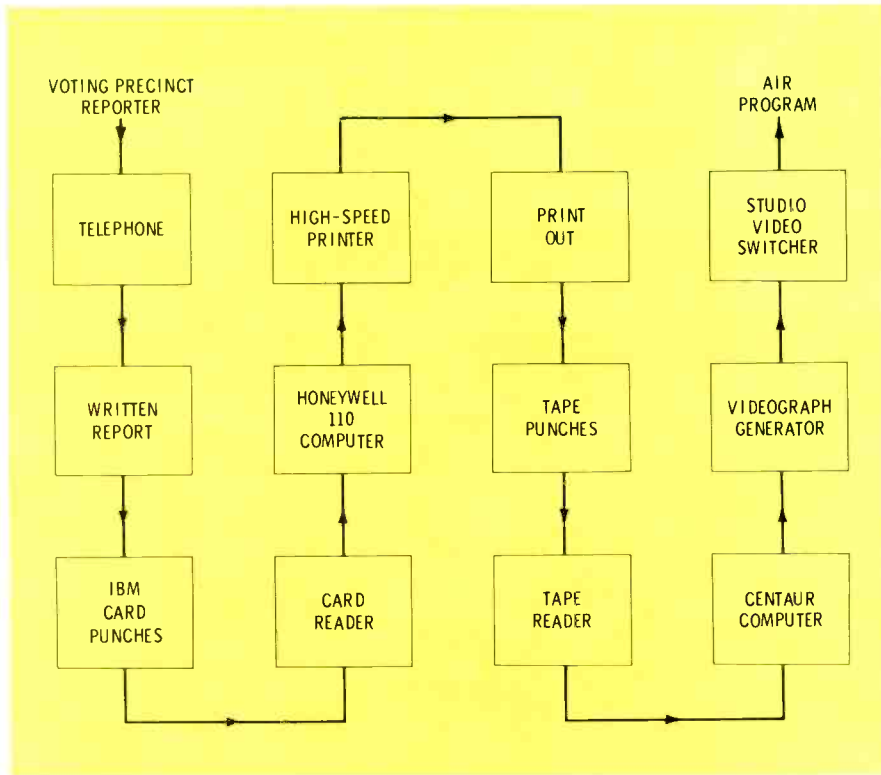


Fig. 7 Overall view of the studio used as Election Center. Votes were also collected and tabulated here.

