

Magnecord Ink

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Smart Magnecord Users Place High In Audio Devices Sound Contest

We have always contended that Magnecord users were the smartest people in the world. Proof of the contention is in the results of the recent Audio Devices' sound recording contest.

Of the twenty prize winners, fifteen mentioned the make of recorder. Ten of



Henry M. Broderick, Jr., chief engineer of station WRDC, Hartford, Conn., receives \$250.00 first prize check from Byrce Haynes, vice president, of Audio Devices, Inc. for his paper "Recording Improves Broadcasting."

these fifteen, including the first prize winner, were applications of Magnecord equipment. A total of nine different makes were cited among the entrants, and 69% of all entrants specifying their equipment used Magnecords. Only 11% used the second choice, and so on.

First prize went to Magnecord user Henry M. Broderick, Jr., chief engineer of station WRDC, Hartford, Connecticut, for his paper, "Recording Improves Broadcasting." In his article, Mr. Broderick covered normal and unusual uses of recording in the broadcasting station.

Theme of the paper was that improvement in convenience, effectiveness, freedom from error and better performance generally can be accomplished by use of tape recorders.

"For the past three years effective tape recording has resulted in the freeing of our control room and announcers from routine station 'breaks' between network programs. Station breaks are

recorded simultaneously at the control room and at the transmitter. A time announcement starts each break providing a definite cue for the correct playback.

"This procedure immediately frees the announcer for other duties. The playbacks are usually run off in the control room. However, when another program is scheduled for recording, the transmitter operator runs off the 'breaks.' This makes it possible for the control operator to give undivided attention to the recording.

"Our FM station relays most of its programs from a music network. Chain-breaks are recorded and played back at the transmitter. This makes it possible for one man to perform the complete operation.

Recording programs for later use is a large part of the schedule. Performers and the control room can arrange for recording at the convenience of all concerned. Most important, too, is the finished end result. Should a musical group find, for example, that the third selection was not quite up to their standards, then that selection can be done over on another length of tape and inserted by editing into the proper place instead of the defective performance.

Should a program run too long, judicious use of the shears can be employed to clip out a chorus or other portion, so

(Continued on page 2)

Cordette Christmas

The Magnecord advertising department has been urging, ad-wise, that there is no finer Christmas gift to the high fidelity enthusiast than a MagneCordette.

They're right!

The MagneCordette was designed for the high fidelity enthusiast. It features a recording amplifier and pre-amp playback. It was designed with the thought that any high fidelity enthusiast already has a quality power amplifier and a good speaker, and duplication would be unnecessary.

The mechanical unit, the tape transport, is the same PT6-AH unit which has become the standard in broadcast installations. The PT6-G amplifier has an extended frequency range of 50 to 15,000 cycles ± 3 db at 15 inches per second tape speed, and 50 to 10,000 cycles ± 3 db at $7\frac{1}{2}$ inches per second tape speed.

There's no finer recorder for the high fidelity enthusiast than a MagneCordette!

INTRODUCE NEW MAGNECORDER M80 AT AUDIO FAIR

The most complete professional magnetic tape recorder was introduced recently by Magnecord, Inc. at the Audio Fair in New York.

The unit, the Magnecorder M80, was designed for $10\frac{1}{2}$ inch reels and incorporates all the latest features of advanced design and precision engineering. Among these are slot loading, safety inter-locked push button controls, unitized construction, and full range frequency response from 30 to 15,000 cycles at $7\frac{1}{2}$ inches per second tape speed.

Other features include automatic tape lifting to remove the tape from contact with the heads during rewind and high-speed forward operation, an "edit" position, and timing accuracy of better than 3 seconds in 30 minutes, assured through direct tape drive from a hysteresis synchronous motor and electrical supply and take-up torques.

The amplifier in both record and playback functions uses direct-coupled cascade input stages which produce a maximum signal-to-noise ratio. Integrated design of all elements guiding and controlling the tape gives the M80 the lowest flutter rate of any professional recorder.

Fail safe brake operate only in the "Stop" position. The M80 utilizes stainless steel, differential band brakes to stop the machine in less than two inches of tape when operating at 15 inches per second.

Frequency response at 15 inches per second tape speed is from 30 to 20,000 cycles.

(Continued on page 4)



Magnecorder M80 in portable carrying cases.

WORLD'S LARGEST AND OLDEST MANUFACTURERS OF PROFESSIONAL MAGNETIC RECORDERS

Clever Magnecord Users Are Contest Prize Winners

(Continued from page 1)

that a tailor-made program results. Microphone placement, balance and other acoustic problems can be arranged to the satisfaction of all concerned.

A small but somewhat difficult problem for the average station is in the producing of an "echo" for dramatic work. A very effective "echo" was developed at WDRC by using an extra head. To get the effect, it is necessary to record the program on tape. The extra head is used as close as possible following the record head, to pick up the material just recorded, and it is fed back to the mixing panel where it appears delayed by about 1/15 second. The "echo" is fed back into the program and the amplitude and duration is controlled by the mixing gain control.

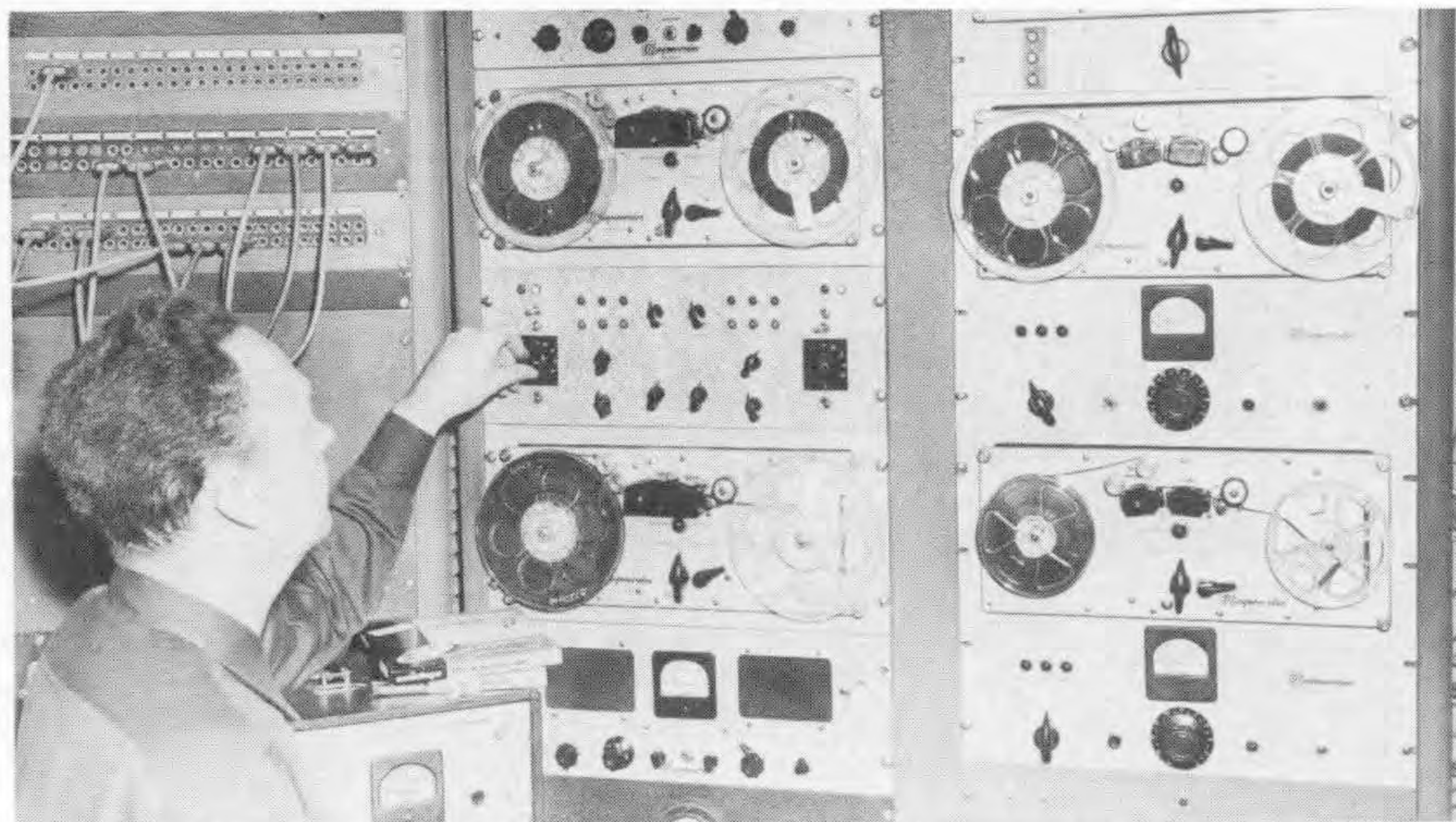
The recording equipment at a station can vary to suit the programming needs. The main recording bay at WDRC consists of two Magnecord tape units and amplifiers, one large reel mechanism, a monitoring amplifier, a speaker, jack strip and selector switches. A five-position rotary switch selects the desired program by bridging various studio units.

Vertical keys, that are program interlocked to prevent two programs getting onto one recorder, select the recorder. This provides for continuous recording or playback, simultaneous recording of one program and playing back another, playing back of two programs at the same time on AM and FM, and for recording a program in duplicate. The rest of the tape equipment is a binaural unit, portable and battery units and a recorder at each transmitter.

Two of the three announced second prize winners also used Magneorders. The other did not specify. In his second

prize winning paper in the Audio Devices sound recording contest, Jesse C. Durham, technical director of the Armed Forces Radio Service in New York, described an ingenious and practical method of editing without cutting tape.

The other second prize winner specifying Magnecord equipment was Lyle Thompson, chief engineer of the John Keating Company, which tape 55-60 hours weekly from NBC, MBS and CBS for the Alaska Midnight Sun Broadcast-



Lyle Thompson, chief engineer of the John Keating Company, Seattle, Washington, checks the automatic starter for company Company Magneorders described in his prize-winning paper on "Automatic Start for Taped Programs."

The advantage of the unique method is an instantaneous system which allows airing of a completely edited show a short time after its performance. The process is used daily by the Armed Forces Radio not only for economy of operation and saving of editing time, but to present a much smoother show.

For the operation of the instantaneous editing process Two Magneorders form a continuous loop, and a third records the final edited show. It's operation is shown in the accompanying diagram.

Normally switch "B" is closed feeding the program through the amplifier to the recorder after a six second delay on the tape loop. The tape machine remote control switch is closed and the machine is running, recording the program. The operator leaves the monitor switch "A" in position to listen to the direct feed (without the six second delay).

When the operator hears the beginning for a program segment he wants to edit, he thinks back to determine the cue point beginning this segment. Then he flips switch "A" to monitor the delayed feed and waits for the cue point.

When the cue point is reached, the operator opens switch "B" and stops the tape machine with the remote control switch. He immediately goes back to the first position to pick up a cue point for the end of this program segment.

When the end cue is determined, the operator flips back to a monitor position at the end of the time delay. When he gets his cue, he again closes switch "B" and resumes recording. The operator then goes back to monitoring the direct feed to be ready for the next program elimination.

At AFRS the editing system is used to tailor athletic events to a definite time block. The Armed Forces rely heavily upon commercial radio and television programs but, at the same time, cannot recommend commercial products. Without the instantaneous editing system there would be a laborious and almost impossible splicing job.

ing Company in addition to its other recording activities.

Thompson described an automatic starting system for Magneordered programs. With only one engineer and a heavy recording schedule it was difficult to catch the exact start of all programs.

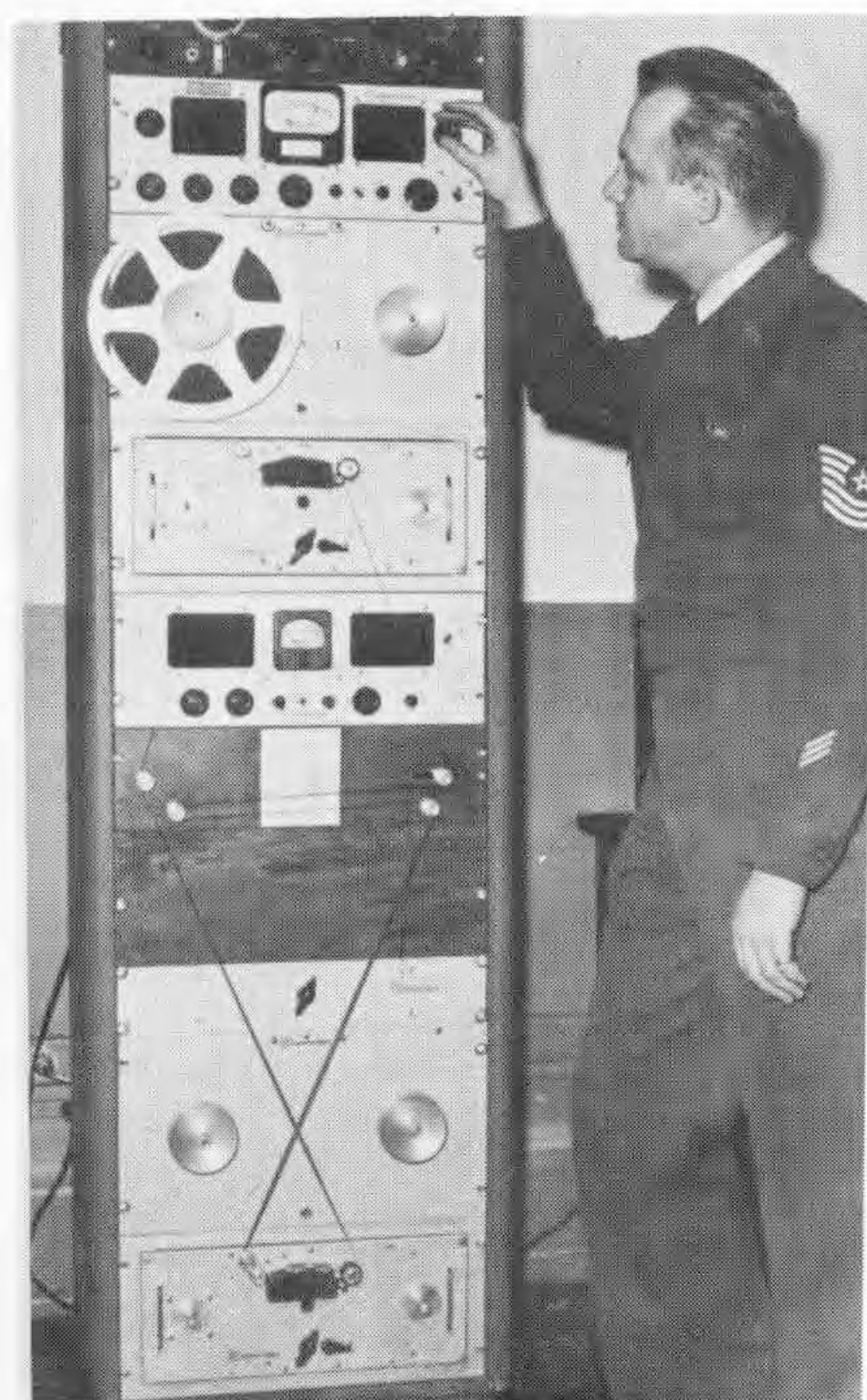
The problem was solved with a glorified "alarm clock." With the automatic starter, programs could be set up an hour before the beginning. The machine is turned "On," and the automatic start set ten seconds before the start of the program. Recording begins only when the starting relay is closed by the "alarm clock."

The operation of the Midnight Sun Broadcasting Company was described in detail in the Nov.-Dec., 1952 issue of Magnecord Ink.

Tape Flight Calls



Jobsel Namkung, Northwest Orient Airlines interpreter at the Seattle-Tacoma Airport, Magneorders a flight announcement for the airport public address system in Japanese for the many passengers travelling to and from the Orient.



Recorder setup for the time-delay loop showing the two Magneorders, special panel with insion roller and ampliér which form the basis of method described by Lt. Jesse C. Durham, USNR, for AFRS "Editing without Cutting Tape."

Magnecorder M80

UNITIZED CONSTRUCTION

The Magnecord M80 features a "unitized" construction. Each assembly is independently removable for service. Each assembly, although completely integrated with the other assemblies, functions as a complete independent unit.

The assemblies are:

- Two reel motor and brake assemblies
- Capstan drive assembly
- Stabilizer roller assembly
- Head assembly
- Front panel assembly
- Push button control assembly
- High frequency bias erase ascillator

TAPE DRIVE SYSTEM

The drive system of the Magnecorder M80 consists of the two reel motor and brake assemblies, the capstan drive assembly and the stabilizer roller assembly. Unique design make this unit the most positive tape transport mechanism.

The stabilizer assembly of the pressure roller consists of a flywheel, a tape roller and a bearing housing, as well as a compliance arm guide. Precision ball bearing are used as both ends of the roller shaft. This assembly eliminates effects of tape sticking and high frequency flutter in the pay-off reel.

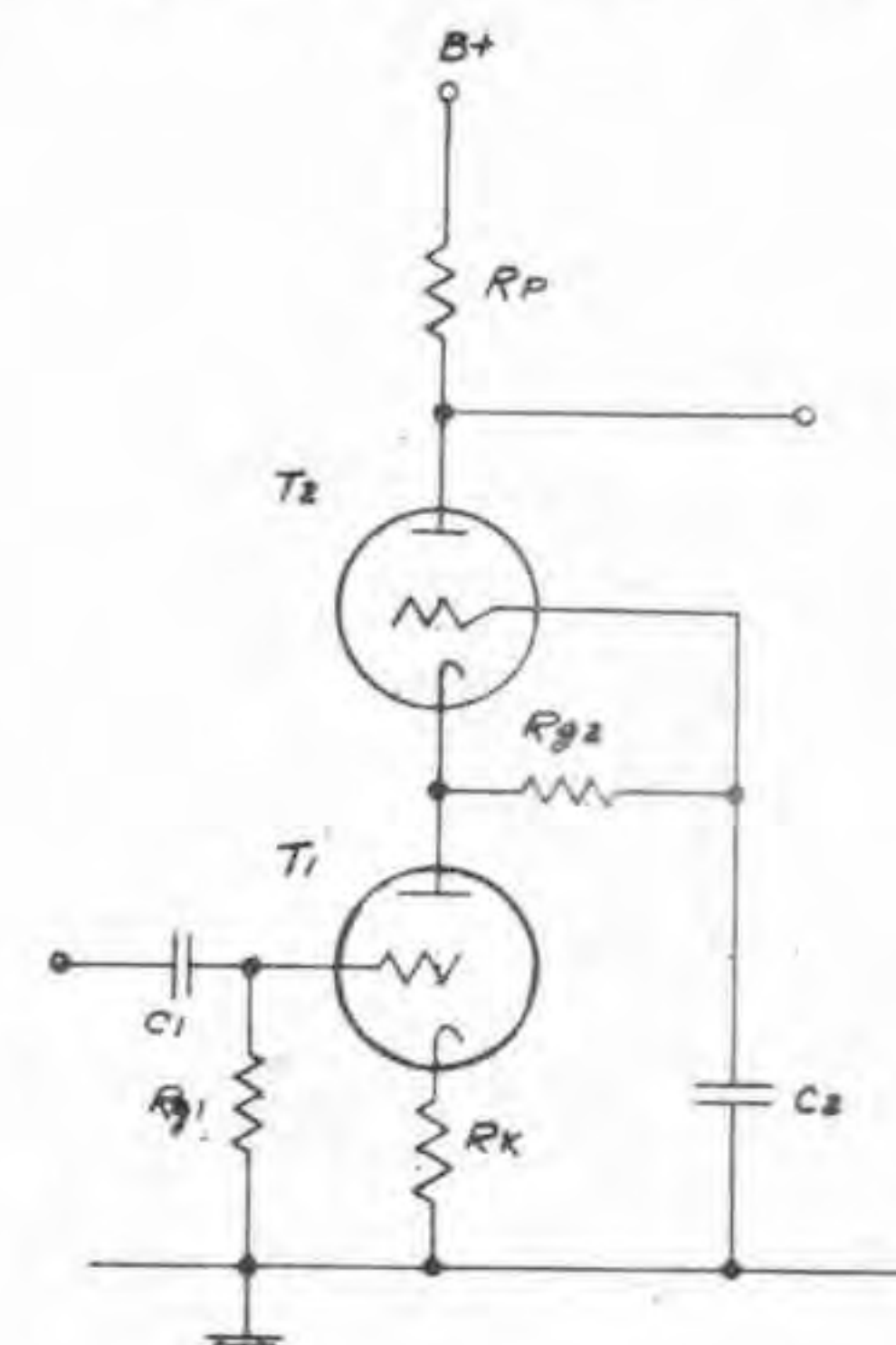
CASCODE STAGE

To improve the signal-to-noise ratio, Magnecord engineers J. Lee Price and William F. Boylan went outside the audio and recording field as it is recognized. Most of the recent work in improvement of the signal-to-noise ratio has been confined to improved design of existing methods. However, maximum results through refinement have been attained.

Price and Boylan went to the work done during World War II in research for a low noise ultra high frequency

resistor. The behavior is similar to a pentode with the advantage of having no screen current and its accompanying partition noise.

The output conductance of the first tube is of the same order of magnitude as the optimum source conductance for the second tube, so the full power gain of the grounded-cathode triode is utilized.



MODIFIED CASCODE AMPLIFIER

ized. No physical coupling resistances are needed, and effective isolation of input and output circuits and low input capacity result in minimizing the effect of noise.

The cascode was further modified by use of a "grid leak" or "contact potential" bias in the upper triode. With this biasing method tube variations have very little effect on the biasing of either triode.

Omaha Newscaster Double-Tapes Trial

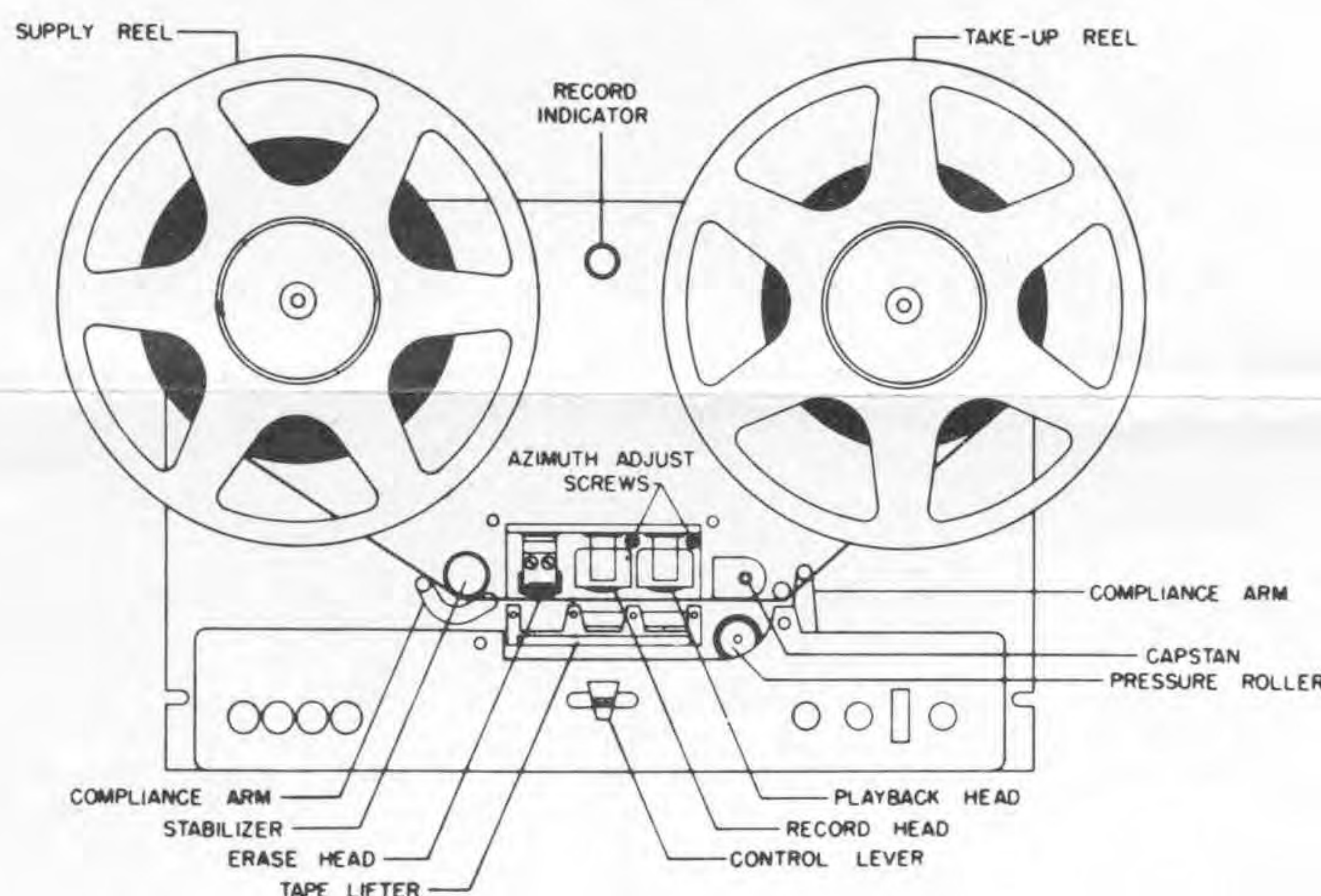
Intense public interest in a recent gory, double-murder trial in Omaha demanded unusual coverage by Station KFAB, Omaha. Hugh McCoy, KFAB Newscaster, received permission from the trial judge "in a precedent setting decision" to broadcast directly from the court room.

A method of double-taping using two sets of Magnecorders was devised by Al Bates, KFAB chief engineer. McCoy's report of the two and one half hour testimony was taped on Magnecorders in the station's mobile transmitter. At the same time, the reporting, via a microphone strung through a window to the mobile unit, was transmitted to the station where it was recorded on the station's Magnecord installation.



Hugh McCoy, featured newscaster, KFAB, Omaha, (left). Chief Studio Engineer Al Bates inside mobile transmitter unit operating Magnecorders.

M80-A TAPE TRANSPORT, FRONT VIEW.



Each of the two reel assemblies consist of a torque motor mounted directly on the front panel, with the brake assembly mounted on the rear bell of the torque motor. During normal FORWARD operation, a reverse torque applied to the pay-off motor maintains a constant tape tension. Slightly greater torque is applied to the take-up motor to spool the tape. The reel mounting flange is mounted directly on the motor shaft.

The capstan drive is directly from a 600/1200 hysteresis synchronous motor with an integral ground capstan, and a flywheel mounted on a rear shaft extension of the motor. The capstan drive motor is mounted securely on a bronze casting which also contains an outboard bearing housing. The casting is bolted to the front panel.

The outboard bearing has been added to prevent damage to the capstan by shock and the possibility of it being bent. This self-aligning Oilite bearing is mounted in the housing which is itself an integral part of the one-piece motor assembly, and assures accurate alignment with the motor shaft.

amplifier for radar by Dr. Henry Wallman, professor at Massachusetts Institute of Technology. Wallman and his fellow researchers at MIT developed a "cascode stage" also known as a grounded grid triode circuit.

Wallman's problem was to develop an ultra high frequency amplifier, more complex than an audio amplifier. In ultra high frequencies absence of atmospheric noise such as static, emphasized amplifier noise which became the limiting factor. Two tubes were connected in series, and the maximum gain of the first was used to over-ride and cushion the noise of the second without resistors which themselves introduce noise.

The basic cascode circuit, as adapted by Price and Boylan for the Magnecorder M80 amplifier, consists of a grounded-cathode triode feeding into the cathode of a grounded-grid triode.

With this circuit arrangement, the upper tube has a fixed DC grid potential at AC ground. This tends to hold the lower triode plate potential fixed, but permits its current to flow in a load

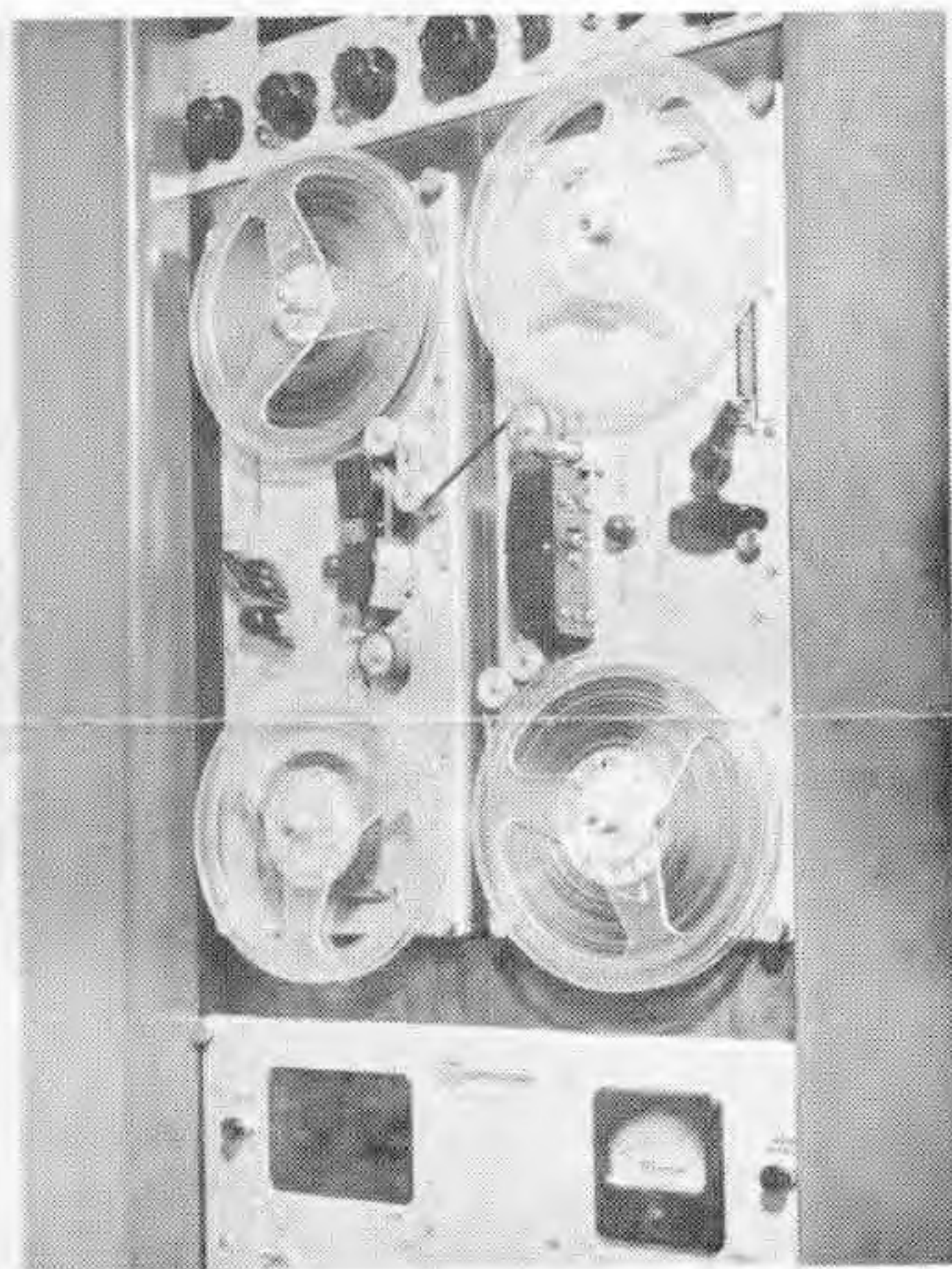
OUT OF THE FLAMES CHAPTER FOUR (Continued)

Last issue we chronicled the story of a Magnecorder in the fire which destroyed the studios of radio station WTHI, Terra Haute, Indiana. It survived and operated.

At that time we warned that this series on the "Perils of PT" would be continued. Since that time we have received word of a fire which destroyed the entire establishment of station KCKY, Coolidge, Arizona.

Jeff Lapping, chief engineer of KCKY, reported that following the fire a PT7-P amplifier and PT6-J amplifiers were used to keep the station on the air in a "crude, but GOING, radio station."

Lapping put two turntables on the first two pots of the PT7-P. The output of the PT6-J and the CBS network line were selected into the bridge input on the PT7-P. A mike in the PT6-J switched to "amplifier" gave them everything they needed . . . microphone, two turntables, tape, and network. Recording facilities of network programs were handled on the PT6-J. The transmitter was fed from the 600 ohm "Record" output.



In another switch which proves further the ingenuity of radio engineers, Lapping described installation of two tape transports, a PT63-AH and PT6-AH, rack-mounted on end, heads to heads.

"Running the tape through all the heads and using an endless variety of patching outputs to inputs and inputs to outputs, echoes to delays, gives weird and amazing results. The time delay can be lengthened by draping the tape over the unused take-up reel."

In concluding his letter, Lapping wrote, "We still use the PT7-P as an alternate control position to facilitate daytime maintenance of our other equipment."

NEW MAGNECORDER M80 (Continued from page 1)

The unit also features two-speed operation with dual equalization, detachable snap-on head covers, four channel mixer, facilities for remote control operation, and interchangeable head assemblies permitting full track, half track or instrumentation recording.

The M80 operates at either 7½ or 15 inches per second tape speed. Speed change is by switching, eliminating capstan changing.

Chrysler Relies On Magnecorders In Automotive Sound Research

Auditioning sounds in a noise-proof laboratory is the newest step in automotive engineers' quest for ever quieter motor cars.

The Chrysler Corporation Engineering Division has developed a procedure for tape recording car sounds and playing them back to a jury of "ears"—to determine motorists' reactions to noise levels, which cannot otherwise be measured in terms of human hearing.

According to L. M. Ball, who heads the division's Electronics Laboratory, the system grew out of "a realization and appreciation that noise is a subjective, a psychological, an individual experience. The way in which human beings react to noises is not something that can be plotted readily on a chart or shown on a meter to measure noise, such as a decibel meter."

So Chrysler engineers place sensitive microphones and Magnecord binaural recorders in Plymouth, Dodge, DeSoto and Chrysler automobiles under test, locating the mikes at drivers' or passengers' ear levels to record sounds in a car as an owner would hear them. They also record specific sounds for special evaluation by placing the microphones in localized areas such as under the hood to detect fan noise, or adjacent to wheels to pick up pavement rumble.

The resulting recordings go to the "sound jury." This body of engineers, designers, and selected "average driver" types (both men and women) then gathers in a room especially constructed for sound work. They listen to the high-fidelity tape recordings played over re-

producing equipment of the finest kind available. (Magnecord)

In rapid succession they hear, over and over again for comparison purposes, the recordings greatly amplified. Comparative wind noise, wheel rumble or fan noise produced by different types of construction or design, thus amplified, can be easily and accurately compared.

Mr. Ball explained that noises which may show very little difference as far as a decibel meter is concerned, make widely varying impressions on listeners if they are heard in an automobile in motion. Yet, in the noise-proof laboratory all the auditors will agree that of two sounds, between which the meter seems to make little distinction, one of them may be acceptable and the other may be unpleasant.

As an example, he said, in one test of a cooling fan, an increase of only about five per cent in fan speed made a substantial difference to the listening jury, but the decibel meter remained relatively unimpressed.

The sensitive tape recordings clearly reveal, Mr. Ball noted, that in making changes to reduce the sound level in a car, it is the combination of the changes that counts and not necessarily any particular one of them.

Mr. Ball pointed out that engineers have learned from the auditions that they rarely can make changes to reduce sound in big bites; instead the work may be a painstaking effort in many directions, each change contributing to the whole and often achieving a far greater improvement than the promise held out by the changes individually.

Magnecorder Named All-American at VPI

Manufacturers are not ordinarily a sentimental lot. Maybe it's football, All-Americans, Homecoming and Homecoming queens. At any rate we're feeling like a happy Dean welcoming old grads and hearing of their progress.

We were put in this frame by a very nice letter from Virginia Polytechnic Institute. V.P.I. purchased one of the first complete Magnecord dubbing set-ups with two D-3 dubbing amplifiers, seven PT6-AH recording mechanisms, and a

PT6-J amplifier.

According to R. D. Michael of the Virginia Agriculture and Home Economics Service, V.P.I. makes thirty tape duplicates each week to service Virginia radio stations with five or six five-minute talks by specialists of the Extension Service.

The PT6-J amplifier is also used to pump a daily 15-minute live broadcast to Station WDBJ in Roanoke, forty miles from the campus.

"It's nice to hear of you . . ."

