Broadcast Equipment nge

....Serving the Communications Industry Worldwide....

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AM Stereo Update: WABC tests look good

New York NY... As reported in the March issue of BEE, WABC-AM, has been testing the Kahn/Hazeltine AM stereo system since 19 February. In a followup interview BEE has learned that the testing to date has gone very well. According to Bob Deitsch, Assistant CE and AM Stereo Project Manager at WABC, all the monaural testing has been completed and WABC is satisfied that there is no degradation of their signal, in any respect. As a mater of fact Deitsch said, "We could meet a monaural Proof of Performance with this exciter, in all respects."

What's Been Done So Far

Since WABC had previously re-equipped their studios for stereo production, going on the air with stereo was no problem. The only transmitter modification required was the addition of one small high voltage transformer for isolation purposes. No antenna modifications were made either. Win Loyd, CE at WABC, did point out though, that they have been planning to broadband their antenna system in the future in any case. Loyd also commented that WABC has been lucky in having no problem with their STL. As was discussed at great length during the AM Stereo session at the NAB/Dallas last March, getting the STL lined up ahead of time is very important for any station planning for AM stereo. In WABC's case, they ordered a 15KHz stereo pair of telco lines some months ago, and it was therefore ready when they needed it. Their only addition to the STL was a dbx noise reduction unit.

The Kahn/Hazeltine Exciter at WABC.

Testing to date has consisted of measurements to detect any monaural changes. Both tone and listening tests, using spectrum analysis and distortion analysis techniques have shown that there are no problems, even at 125% modulation. Stereo tests to date have been just listening and WABC plans on completing the stereo measurement within the next month. In fact they have applied to the FCC for an extension of their STA to continue testing as long as possible. Their confidence is demonstrated by the fact that they have been transmitting continually in stereo since 2 April without any problems. In next month's issue of BEE, we will report on the results of the final stereo testing.

Other Station Tests

According to Leonard Kahn, the following stations are now either on-the-air testing, or will be within the next few weeks: WFIL/Philadelphia, KDKA/Pittsburgh, KTSA/San Antonio, XETRA/Mexico, KHJ/Los Angeles, KFRC/San Francisco, KING/Seattle, KCMO/Kansas City, and WOW/Omaha.

INDEX

WABC Tests 1
Harris/AM Modulators 2
New Dealer 2
LBA Interview 3
RCA TV Transmitters 4
3M Skew Error 5
Motor Replacement 5
FCC Developments 6
NRBA Comments 7
ATS 8
McMartin Subcontract 8
Clint Free on VTR's 9
TRC-15A Note 9
Australian BEE 9
Ampex Digital Standard 10-11
New Products 12
BEE Employment Service 12
Televisa Order 12
"The Exchange" 14, 16-22
Action-gram 15

Harris: Troubleshooting AM modulators

by Karl D. Lahm/
formerly with Harris Corp.

Part Two of a Three Part Series

Quincy IL...All AM modulation systems employ some sort of feedback in the modulator stage. The effects of feedback...or the lack of it...will directly affect modulator performance. It is therefore wise to give particular attention to feedback effects when trouble shooting AM modulators. In the first part of this series, the basics of inverse feedback and feedback from the primary of a modulation transformer to the first audio amplifier stage were discussed.

Determining the Nature of a Feedback Problem

Feedback problems generally manifest themselves as poor distortion, response, and stability of the modulator section. An initial determination of feedback level is necessary since it affects all performance parameters (see Part I for an expansion of this). The determination procedure is the same as that outlined in Part I. The audio gain change for operation with feedback disconnected and then connected should agree with the figure given in the transmitter instruction book. Be sure that you only disable *audio* feedback (through the use of a large shunt capacitor in the detector, for example). Some transmitters, PDM and PSM in particular, use DC feedback which would also be disabled, causing power stability problems. If the instruction book does not spell out the amount of feedback used, check the transmitter input sensitivity for 100% sine-wave modulation against the factory test data sheet or maintenance records. If the sensivity has changed more than +-1 dB, a feedback deficiency is indicated.

Two types of problems with feedback are actually possible. Amplitude errors are quickly found, as explained above.

Response problems can occur also, especially in a transmitter which employs response shaping in the feedback circuits. The PDM transmitters, for example, operate with less feedback at higher audio frequencies to avoid problems of improper antenna system loads interacting with the PDM filter characteristics to produce a net input-output phase relationship of nearly 0 or 360 degrees. A change in feedback amplitude will be, and has been, improperly diagnosed as a response problem. The feedback amplitude at midband should be checked first; if it is proper, a response problem due to a deficiency in the shaping networks is indicated.

Amplitude problems are invariably caused by bad or ailing recitifier diodes or improper voltage division prior to the input of the feedback rectifier. Voltage dividers may take the form of resistive, inductive, capacitive, or transformer networks. Improper turn spacing, pickup positioning, or a faulty shunt arm component should be investigated.

DC Feedback— Its Purpose and Problems

The advent of the modern direct-coupled modulator (as used in Harris PDM and PSM transmitters) permits the modulator system to act as a regulator controlling the final power amplifier output. Such systems adapt to overall DC feedback easily. DC feedback stabilizes the radio frequency power output with respect to power line voltage changes and component heating effects. Systems using combined DC and audio feedback exhibit superior transient response performance. The use of DC feedback sometimes makes audio feedback problems easier to trace, but many technicians are confused by it.

Any amplitude-related AC feedback problems will affect DC performance. If AC and DC feedback level is reduced (due to rectifier and input problems discussed above) the power output stability will go down. This manifests itself as very "touchy" power controls and negative carrier shift. A semiconductor characteristic change would introduce carrier shift of either polarity and overloads if control and/or corrective circuits are triggered by overshooting pulses.

Whenever a problem with a direct-coupled transmitter is encountered, it is first necessary to check the DC performance. The easiest methods of checking feedback levels are the audio methods described previously. Another way is to establish the "typical" DC voltage at the output of the feedback rectifier through several weekly measurements. With this information noted in schematics and instruction books, a quick VOM check of this voltage will reveal any feedback level deficiencies. "Tracking" of the system is checked by running the power adjustment controls from rated power to minimum back to rated, looking for any "glitches" on the power output or antenna current meter. Such "glitches" would indicate either a semiconductor problem or a faulty capacitor "punching through" at some voltage level.

Operation Without Overall Feedback

If a fault occurs which disables feedback and it cannot be immediately corrected due to lack of parts or other problems, a clever technician can return the transmitter to service. The easiest situation to correct is audio feedback failure. The only corrective action immediately needed is to reduce the audio input level to prevent overmodulation or avoid distortion. Should the transmitter employ response shaping, the solution is not so simple. The path from audio input terminals to modulator output must be checked for response determining networks. Significant networks must be modified to result in as nearly flat a response as possible at the transmitter output. This usually means that shunt capacitors over 1000 pf should be disconnected in low-level audio stages, but check your transmitter schematic carefully.

Transmitters using DC feedback present just a bit more of a problem. Although it is possible to operate the transmitter without feedback or modification, it is advisable that some method of reducing the power control system bias be provided. This is most easily done by creating an add-on circuit which simulates the feedback voltage, such as a bench power supply or a resistor-zener arrangement connected to the transmitter low voltage supply. If nothing else is available, a low-value resistor between feedback summing point and ground may do the job.

In Part Three

The "brute force" method of checking modulator performance at full audio power output without connection to the RF stages will be explained in Part Three.

Reprinted from "Pride in Service," a Harris Corp Publication.

New Broadcast Dealer

Columbia MD... Gene Bidun, former District Sales Manager for Harris Corp, has formed his own company, Bidun & Associates, to sell and service broadcast equipment. The new firm will be responsible for sales of Cetec Broadcast Equipment in the states of Maryland, New Jersey, Pennsylvania, Delaware, West Virginia and Washington DC. Technical services such as proof of performance, station equipment repair and engineering assistance will also be available.

Consultant's Corner:

An interview with Behr Associates

Greenville NC... Since many of the broadcast consultants are so hard to pin down in terms of writing about their opnions, BEE decided to go to the consultants by telephone interview. This month we will talk with Lawrence Behr Associates about antenna systems and AM stereo.

BEE: My first question is why is there concern over antenna efficiency and bandwidth regarding the shift to AM stereo systems?

LBA: Stations are concerned about whether they will be able to essentially "squirt" the stereo signals out through their existing antenna systems. We do know that the stereo systems proposed will require better bandwidth than many stations have now. Also, since the AM stereo systems may reduce effective coverage, the stations will have to maximize their antenna system's efficiency to maintain their competitive positions.

BEE: Will the advent of AM stereo make many stations change their antenna system?

LBA: Any station that now has inadequate audio response because of bandwidth considerations will not be able to perform satisfactorily with any of the proposed AM stereo systems. But remember, some are more critical than others. Any station that is going into stereo in a serious way is going to want to optimize their antenna systems from the point of view of bandwidth. Generally, most stations that have antenna systems in good repair and that are well designed won't have any problems. The stations (non-directionals specifically) that are going to have problems are those that are operating with very short antennas. I'm talking about antennas around 300 feet or less down around 550 and under 100 feet up at 1600. It is very difficult to achieve decent bandwidth out of these antennas, and there are a lot of them around the country. Here the station is going to have to consider increasing the antenna height, top-loading or unipoling or something of that nature.

BEE: What about the tuning units and the coax?

LBA: If everything is in good repair and well designed, no problem. If it's old equipment with stability problems, it needs to be cleaned up. Going stereo may be the incentive to clean up in this area, and a lot of stations could use it.

BEE: What are the directional antenna considerations?

LBA: It's really with the directionals that the problems are going to arise in changing to stereo. With about 30% of the stations directional, and since many of the systems are critically designed (with poor common point impedances), their whole system will have to be re-evaluated. Some arrays simply cannot be broadbanded. Even in mono they don't have the sound they want. In the old days many of these arrays were designed using less sophisticated tools so the number and depth of the nulls was difficult to tailor. With the new computer assisted computations, the patterns can be redesigned so that even the response in nulls can be improved. Here again, stereo may provide the impetus for redesign, and then other market factors (such as population shifts, etc) can be taken into effect simultaneously. A preliminary engineering review may be made for as little as $500, but depending upon the system, costs can go higher. In most cases the antenna shouldn't be the limiting factor in going stereo...but it certainly needs to be looked at closely.

BEE: What about the "9 KHz Question?" Do you see relationships with the stereo question from the antenna point of view?

LBA: There is the problem of bandwidth between the 2 questions. But, since the "9 KHz Question" has many international aspects, it might not be settled for a few years. Stereo is going to come first. As before, whatever problems there are will show up most on critically designed directional antenna systems.

BEE: What might be the "9 KHz" conversion costs?

LBA: For 10% of the stations the costs could run between $1-

Continued on page 4

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RCA introduces line of VHF TV transmitters

Camden NJ... RCA Broadcast Systems has introduced a new line of advanced-design VHF lowband and highband television transmitters for worldwide applications. Designated the "TTG" series, the new transmitters were highlighted in RCA's comprehensive exhibit of television and radio broadcast equipment at NAB-Dallas in March.

The "TTG" series of transmitters feature the latest in advanced solid-state design technology, to provide a superior picture and reliability of operation, according to J.W. Hill, Division Vice President and General Manager, RCA Broadcast Systems. "New developments in electronic design permit the use of only two tubes in the entire transmitter, one visual and one aural," Mr. Hill said. The elimination of tube amplifier stages, with all circuitry being solid-state up to the 1600-watt visual and 100-watt aural driver output power levels, minimizes the need for attention and maintenance, he added. In addition, breadband techniques used in the new transmitters eliminate all tuning requirements except for the final stage.

The new transmitters will be available for operation on worldwide color broadcast standards, including NTSC, SECAM, PAL-B and PAL-M, meeting requirements for essentially all bandwidths and channel assignments. For all requirements, a universal crystal oscillator, combined with a unique frequency synthesizer circuit, accomodates any channel or frequency offset, Mr. Hill said. Both aural and visual frequency are controlled by the same crystal. A broad range of power classifications, system configurations and broadcast standards are available with the "TTG" Series, with a choice of 20 transmitter models, each specifically suited to individual requirements. The transmitters in the "TTG" Series are designed to operate conservatively at power levels 20% greater than previous designs. A single lowband or highband transmitter is rated up to 30-kilowatts of visual power and 6.6-kw aural power output. Parallel configurations are available to support circular polarization, to supply extra power headroom, or to provide an added measure of on-air reliability, Mr. Hill said. A dual transmitter, with two units in parallel, operates at up to 60-kilowatts visual and 13.2-kw aural power output.

Offers Many New Features

A single transmitter is made up of three compact cabinets, the exciter-/driver, the power amplifier, and the power supply, interconnected by factory tested, plug-terminated cables. For parallel configurations, a combining cabinet, housing the two exciter-modulators, joins the two single systems. The combining units also provides isolation between the transmitters, so each operates idependently for more on-air reliability. Regardless of operating configurations, optimum linearity correction is maintained by circuits dedicated to each RF amplifier system.

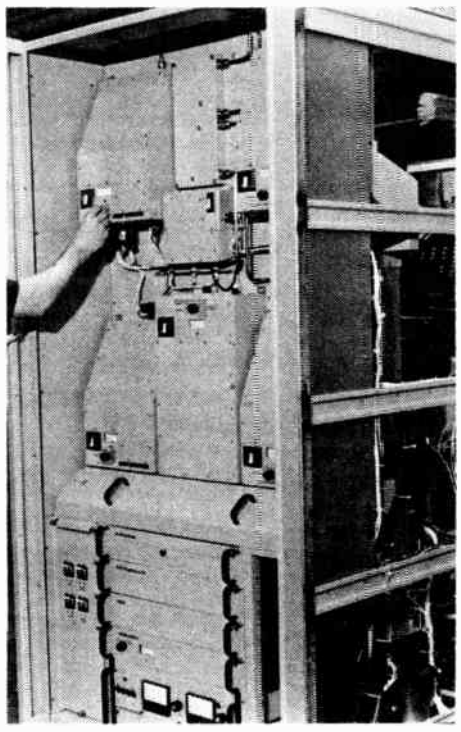
New and extensive personnel safety features have been designed into the new transmitter, Mr. Hill said. A key operated interlock system ensures that all high voltage has been eliminated before gaining access to tubes and cavities. Additional protection from high voltage is provided by electrical interlocks. No high voltage wiring is external to the cabinets, and no DC voltages in excess of 46 volts are present in the entire driver cabinet.

Many advances in electronic design are incorporated into the new line of transmitters, such as the use of broadband microstrip circuitry, Mr. Hill said. This technique results in precise control of the signal path and improved reliability through elimination of leads and connectors.

A solid-state power controller replaces mechanical high voltage contactors, and provides fast, controlled application of plate voltage to the power amplifier tubes, and increased overload protection due to a faster tripoff. This soft turn-on voltage eliminates high-voltage stress on tubes and other components, Mr. Hill noted.

A "heat pipe" cooling system, with proven reliability in military and space applications, transfers heat from the power amplifier transistors to a heat sink, and allows the high level of solid-state design used in the new transmitter line. This unique closed cooling system is built into each visual IPA amplifier module.

An automatic solid-state control system stabilizes both visual peak power and aural power output levels, and prevents power output variations due to line voltage fluctuation, power line and power supply regulation, and other factors.



RCA's new "TTG"

Another automatic system reduces power in the event of a deteriorating load VSWR such as antenna icing conditions. The transmitter power output is reduced at a controlled, monitored rate, allowing the station to stay on the air at a safe power level.

In the event of a power interruption of up to ten seconds, automatics in the transmitter are designed to get the unit back on the air within two seconds of power restoration. For interruptions of more than ten seconds, the transmitter can be back on-air within four seconds of power resumption, by manually by-passing the normal time delay of two minutes.

The new line of tansmitters use RCA's unique Surface Acoustic Wave (SAW) filter, temperature controlled to assure optimum performance under all operating conditions.

CORNER

... from page 3

10,000...again, only if they have critical directional antenna systems. For the others, the costs might be as low as $100, if anything at all.

BEE: Thanks for your time, and if any of our readers have any questions for you, I know you will be happy to respond.

3M: Causes and effects of skew error

(Extracted from "Retentivity.")

New York NY...Skew error is any change in the length of track between the time it's recorded to the time it's played back. Dimensional errors caused by uncorrected playback of the video track are called skew errors.

Skew refers to what is seen on the monitor when the picture at the video head switching point is not matched up vertically, but is offset to the right or left. This is caused by the playback track length of the machine being different from the video track length previously recorded on the tape. Skew error may also be called tension error.

By their very nature, helical video recording systems depend upon the length of the video track for correct reproduction of the video system, so skew error problems and their solutions are important to the broadcaster.

With the advent of the ¾ inch videocassette, increasing demands are being placed on the video tape media for better dimensional stability to assure proper video track length. The lower machine tensions have greatly decreased the amount of playback correction available, for example, the ¾ inch format has a correction range of only +- 2.5 microseconds.

Electronically, skew error produces a timing error or time displacement of the horizontal sync pulses at the video head switching point. Visually on a monitor, this offsets the picture image to the left or right at the same point. If the picture is displaced to the left, the video track on the tape is longer than the playback track length of the machine. If the picture is offset to the right, the video track on the tape is shorter than the playback length of the machine.

The degree of noticeable skew error depends upon the type of television receiver used. Older monitors and receivers have long time constants in their horizontal scanning circuits and this will cause the video to be displaced by as many as 100 lines. This amount of noticeable distortion is quite visible. Newer monitors or receivers, with shorter time constants, can correctly place the video with only a slight distortion.

How to Measure Error

Skew error can be measured by observing the video head switching point on a pulse cross monitor. First, measure the displaced video and then compare this with a measurement of some known time on the raster, such as the horizontal sync or horizontal blanking pulse. For example, if the displaced video measures 5.5 cm and the horizontal blanking pulse measures 7.0 cm, the error may be calculated by the following equation:

$$\frac{\text{Length of Displaced Video (5.5 cm)}}{\text{Length of Known Video (7.0 cm)}} \times \text{Time of Known Video (11.43 microseconds)}$$

= 9 microseconds

Skew error can be caused by tape or machine. Machine induced skew error can be caused by incorrect tensions. This will stretch or relax the tape around the drum. The tape will lengthen or shorten the video track. The type of tension that is critical depends upon the particular machine format: ¾£ videocassette format, ½£ EIAJ type I, and home type video machines are some examples where the supply reel tension determines the track length. The one inch IVC format is an example where take-up reel tension determines track length. Tensions should be adjusted according to the service manuals so that skew error from one machine to another is minimal.

Aging & Temperature a Problem

Thermal expansion/contraction may be considered as a source of skew error since the tape and machine do not have the same co-efficient of expansion. Machine tension control mechanisms can usually accommodate the differences that result in normal temperature change ranges.

Tape induced skew can be caused by the dimensions of the tape changing over a period of time. The reversible dimensional change is due to thermal and hydroscopic properties of the tape, mainly related to the polyester backing material.

When backing is manufactured it is processed under controlled temperatures and tensions to provide the desired strength properties. These properties are stable in a certain temperature, time and tension range. If any one of these variables exceeds the acceptable range, the backing takes on a new shape, usually longer if tension is exceeded and shorter if temperature is exceeded.

These dimensional changes are considered non-reversible because the tension conditions encountered in normal use do not reverse the change and bring the tape back to its original length. Experience has shown that the shrinkage type of skew error is most troublesome; second only to incorrect record/playback tensions of the machines.

Because of the increasing demands being placed on video tape with long term library storage and new applications such as Electronic News Gathering, 3M Company anticipated the need to produce a highly stable tape that would experience minimal permanent physical dimensional changes.

By careful control of the manufacturing processes, from manufacutre of backing through production of the finished tape, we are able to produce a stable product. "Scotch" Brand helical scan video tape will result in less than .03 percent base error due to shrink.

A stabilized tape will have a longer useful life while allowing the user to operate, ship and store his video tapes in a much wider tolerance of environments. A significant cost savings can be realized by the prevention of unnecessary re-recording of badly skewed tapes.

Replacement for Japanese motors

North Haven CT... Audio cartridge tape machines require hysteresis synchronous tape drive motors to be unusually precise in performance, rugged in construction, and compact in size. But the Japanese-produced motors used by some cart machine manufacturers have not delivered the life and operating specifications needed for broadcast use. The unique "inside-out" design of the Beau motor, produced by the Broadcast Products Division of UMC Electronics Co. meets these requirements.

The inside-out design of the Beau motor differs from the conventional in that the stator core and windings are the internal members, while the rotor is the external member. this design diminishes the magnetizing current and results in approximately half the magnetizing losses in iron. Small field density in air gaps and precision assembly make it possible for the motor to operate in a smooth and quiet manner. The inside-out motor, compared with similar sized and rated motors, out-performs its conventional counterparts.

In the Beau motor, the diameter of the stator is much larger than in standard motors and the circumferential distance for a corresponding number of poles is much larger, making it possible to go to lower speeds without cogging. The flywheel effect from the large rotor overcomes any slight magnetic changes that may be present and, therefore, no cogging occurs. Beau torque and hysteresis motors have been widely used for twenty years in precision turntables, video recording equipment, and data handling devices.

Report on April FCC developments

by B. Jay Baraff/
Baraff, Koerner & Olender, P.C.

Guidelines For Programming Reduction.

The FCC, in renewing the license of a Rochester NY, station indicated that a 10% reduction in public affairs programming was not a substantial variation in its commitment. Substantial was defined as a decrease of 15% in any of the the three non-entertainment categories or a combined 20% in the three categories.

FCC Reaction On First Distress Sale.

In its first distress sale ruling involving Station WAEO-TV, Rhinelander WI, the FCC stated that a distress price would be determined by the assessed fair market value of the station, with the contract price falling substantially below that value. In addition, the FCC now requires two appraisals from brokers who are unaffiliated with the applicant to verify the fair market value. The Broadcast Bureau has informally indicated that the maximum price for a distress sale can be no greater than 80% of the fair market price. However, the Rhinelander sale was 54%, which sets a low precedent. Thus, if anyone is considering such a distress sale at 80%, be prepared for some possible resistance from the Commission.

Caution To Double-Billers

Although it appears the Commission, under Chairman Ferris, is going to be more lenient toward enforcing double-billing, there still will be instances of license revocations as is seen in the revocation of WJPD AM/FM, Ishpeming MI. The ALJ revoked these licenses for double-billing in which the licensee was an absentee owner and did not supervise the operation of the stations.

Further FCC Ruling On Minority Ownership

The FCC has ruled that requests for expedition of an application which is mutually-exclusive with several others will be granted as long as one applicant in the group is a minority owner and proposes minority-programming. This is important since it can shorten the waiting period by several years.

FCC Considers Proposal For Expanding FM.

NTIA has proposed creating new FM stations for minority ownership by reducing channel width from 200 kHz to 150 or 100 kHz. NTIA feels that this can be done by directionalizing and using improved receivers.

Broadcast Rulings

- The FCC ruled that an application designated for hearing would not require a new file number if an existing stockholder with negative control (50%) acquires positive control. This application can be filed on a short form (316) rather than a long form (315).
- FCC ALJ renewed the license of Station WABZ-FM, Albemarle NC, on the basis of its meritorious record which was given a plus of major significance in comparison with the other applicant.
- The FCC remanded an ALJ's ruling and added a character question against an applicant for a new FM station in High Springs FL, on the basis that one of its stockholders had failed to pay Social Security taxes for a non-broadcast related business. This should thus be a reminder to all parties in a comparative hearing to have each of your principals disclose every business involvement, broadcasting or non-broadcasting, since it may affect an applicant's qualifications.
- The FCC has denied a settlement/merger year Pasadena AM case because one of the merged applicants had an absolute contractual obligation after three years to purchase the stock of the remaining applicants and they had an absolute obligation to sell. FCC will allow options to buy stock in a merged entity as long as the parties share risks and profits for the foreseeable future.

Delaware TV Proposal Receives Expedited Consideration

The FCC has granted expedited consideration for a new commercial UHF television application on Channel 38, at Seaford DE, as a result of motions by Delaware citizens' committees indicating their concern about the lack of local television service. This application would be Delaware's first commercial television service.

EEO Ruling

The FCC has denied reconsideration of Station WNMB (North Myrtle Beach SC) of its short-term renewal because of its employment and recruitment of minorities. The FCC ruled that even though the community of license has less than 1% black and was not in an SMSA, the licensee should have based its employment standards on the county which was 21% black, since the licensee's 1 mv/m contour covered a substantial portion of the county. This should be warning to licensee's that regardless of the minority composition in your community, you should analyze your entire county to determine hiring practices.

Tax Certificates

The FCC refused to grant a tax certificate for the transfer of Station

(Continued on page 7)

NRBA comments on Rewrite II

Washington DC... The Executive and Legal Committees of the National Radio Broadcasters Association have authorized release of the following statement:

The National Radio Broadcasters Assocation is impressed and appreciates the extensive effort devoted to the preparation of the Communications Act of 1979 ("Rewrite II") by Congressman Lionel Van Deerlin, as well as the staff of the House Communications Subcommittee of the House of Representatives. The NRBA wholeheartedly supports the basic phillosophy which gave rise to Rewrite II, which as stated in HR-3333, is that "the public interest is best served when marketplace forces, rather than government regulation,..." control the operations of broadcast facilities. A radio station *must* serve the needs and interests of its community to be successful.

However, the NRBA reiterates its opposition to that portion of Rewrite II which requires broadcasters to pay a spectrum fee. The NRBA recognizes that the airwaves are a valuable public resource and our opposition is in no way predicated upon the belief that because a broadcaster has a license to operate on those airwaves, that broadcaster has somehow acquired an immutable, inviolate property right in the license. Furthermore, it is not the amount of the proposed spectrum fee to which we object, it is the entire concept—it is the power which the Congress will have to increase the fee which troubles the NRBA and should cause concern to all members of the public. In the history of this country, new taxes, no matter how minimal they may be at the start, never disappear and have a habit of escalating—we need only trace the progress of the income tax over the years to appreciate that the fear of an escalating spectrum tax is wellfounded. While it is an aphorism and a truism which some people dismiss as trite, the fact is the power to tax is the power to destroy, and a spectrum fee is nothing more or less than a tax with a different name.

The NRBA is against any legislation which would create a mechanism which could be utilized by the government to further its efforts to intimidate a free broadcast press. Recently, we have seen examples of the efforts of government to control the media by the use of available pressures. The mere threat of a substantial increase in a spectrum tax would be intimidating to the broadcaster. While legislation increasing the amount of the tax would have to be passed by Congress, we need only look to the history of the last half-century for examples of how a strong and dominant President controlled Congress to the point where legislation was passed at the direction of the White House.

In sum, the NRBA believes strongly with Congressman Van Deerlin that deregulation can only be accomplished by an Act of Congress—that deregulatory efforts by the Federal Communications Commission can at best be ameliorative and would ultimately amount to nothing more than reregulation. However, we further believe that a spectrum tax places into the hands of the Congress and the President power which could be used to manipulate the broadcast press. All citizens as well as broadcasters should oppose any efforts to place such power into the hands of government, since a free broadcast press is essential to the effective functioning of our demo-

(Continued on page 8)

FCC

...from page 6

KVVY-TV, Henderson NV, on the basis that the proposed applicant was only 30% minority. Although the FCC seems to be holding to a 51% controlling interest by minorities, Chairman Ferris indicated that, in the absence of outright control, a tax certificate might be granted with operational control as long as minority participation would not evaporate at the whim of the controlling stockholders.

More AM Stereo Authorizations.

FCC has issued another authorization for AM stereo tests to KING, Seattle WA. Consistent with prior grants, this authority cannot be used for promotional purposes.

Applicant Denied Channel Because Of Rulemaking.

In an unprecendented decision, the FCC has deleted a commerical channel for Newport VT, in which an application had been filed in order to assign the channel to Burlington VT, for non-commerical use. It was argued that this was the last opportunity for non-commercial educational radio in northern Vermont and that it would provide the first non-commercial educational service to approximately half the population in the entire state.

ATS: Rehearsing for a comeback role

by David C. Burns
Allied Broadcast

Richmond, IN...ATS is alive and well and performing amazing feats with ease daily. Several stations appreciate the precision with which routine duties are accomplished. Engineering personnel are free to be more creative, assured at the same time that "someone" is minding the store.

Automated, lock-up, walkaway operations have become a reality. If EBS, modulation monitoring, and transmitter remote control requirements are met, off-premises operation is possible. Remote operations of this type which will satisfy FCC requirements could be in such diverse locations as a staffmember's home, a police station or hotel front desk. The commission must be satisfied in each case that the off-premises operator will perform his/her duties in the public interest and be in actual charge of the facilities, but, is apparently amenable to almost any legitimate arrangement. Dual-location remote control which is now available has been highly beneficial to this cause. EBS tests *must* be possible from the remote point, and ingenious methods have been designed. Compliance with EBS situations which would require discontinuation of normal programming may be met by simply requesting designation that would allow the station to sign-off.

Indeed, recent government action has removed much of the attraction, especially for those who were constantly battling the endorsed/third class personnel problems. However, not only are automatic transmission systems working seven days a week now, their greatest objective may already be on the horizon.

Discussions are underway in Washington which will ultimately result in the annoucement of rules which will permit a more relaxed attitude for directional arrays of almost all types. Unlike other "relaxations" which we've experienced recently, this one involves equal FCC/user responsibility. High-placed sources indicate that while benefits will easily justify costs, the sophistication required will be capable of a tighter directional ship than is prevalent in many operations today.

This is of mutual benefit; owner-operators can be assured of compliance *all* their broadcast day since corrections will be made, probably, on a minute-to-minute basis. This will also result in less chance for citations. The FCC also stands to gain in this automatic approach. The sprectrum control with which they are charged will be come more manageable as ATS-Controlled DA's are automatically kept within permissible limits.

A great deal of federal soul-searching will continue as the DA ATS rules are realized. Each system will be truly unique. Normally encountered system variations will have to be dealt with. These expected variations that are many times "understood" are very difficult to translate to legal rules. Sophistication will probably necessitate, if not mandate, equipment design beyond the scope of many individual stations' in-house capabilities.

As an example, Stevans Electronics is preparing now to meet this challenge by expanding the proficiency of their field-proven Model OP1 so that new rules may be provided with total and accurate compliance. OP1's microprocessor base enables it to conform to almost any eventuality as it is now configured and Stevans engineers stand ready to be responsive to the new rules and whatever new requirements they may present. Original engineering decisions, which dictated a "programmable" system, permit not only simple operations but also allow more exotic functions including (but not limited to) continual attention to +1 db modulation levels, tower lighting auto checks, and "soft" non-interrupting ATS to manual/manual to ATS operation. The latter of these allows an operator to take manual control of an ailing transmitter which may otherwise inform the ATS that shutdown should occur.

Be prepared for stringent requirements, requirements which will effect the benefits for which ATS was originally intended. When the FCC approves ATS for directional arrays, Stevans for one will be ready.

McMartin receives sub-contract

Omaha NE... McMartin Industries has been awarded a subcontract by the Collins Transmissions Systems Division of the Commercial Telecommunications Group of Rockwell International for the design and manufacture of coordination channel modulators and demodulators for satellite communications.

The system is being developed by Rockwell for the Corporation for Public Broadcasting to provide a satellite interconnect system for National Public Radio (NPR). The system will not carry the NPR programs, but will provide a communications link between the network and member stations.

The Rockwell contract includes an order for a substantial number of units, the first group to be delivered by mid June, 1979. The units are also being marketed to other users directly by McMartin Industries as the McMartin SMR-1, IF Modulator, and the McMartin SDR-1 IF Demodulator. Both units are intended for narrow band FM services utilizing a maximum 5,000 Hz audio bandwidth in the 52 MHz—88 MHz band. The products can be used to transmit both audio and digital information and are also suitable for terrestial microwave applications.

The IF Demodulator is especially interesting because of its ability to acquire, track, and relock a very weak FM signal even when the transponder frequency error exceeds = 50 kHz. It also delivers at least 33 dB signal-to-noise ratio for a carrier-to-noise ratio of 14 dB in a 25 kHz predetection bandwidth (equal to a C/KT of 58 dB) and a = 10 kHz deviation.

In addition to the NPR system, the products should find other applications in broadcasting, CATV, and digital communications.

NRBA

...from page 7

cracy. To be vital, the press broadcast as well as print must be free to criticize the government, to search out and focus upon inequities and injustices, and to bring to the public's attention misuses and abuses of government power. A spectrum tax would place into the hands of the government a weapon which could be utilized to mute and even reverse efforts along any of those lines by the broadcast press.

NRBA's opposition to the spectrum tax should, in no way be interpreted as opposition to Rewrite II. NRBA believes HR-3333 is the appropriate vehicle for achieving the long overdue deregulation of radio, attainable only through legislation.

With appropriate modification, NRBA believes that the passage of HR-3333 will benefit the American public and reinforce the traditional American concept of a free marketplace.

Clint Free on VTR's:

Headwheel control

Knoxville TN...I would like to thank those of you who have commented on my previous two articles. I need all the help I can get!!!

With this, I am beginning a series of articles which will explain how headwheels are brought to speed (2400 rps for domestic standards), to phase and then to jitter and drift rates of less than 140 nanoseconds. The series will run for 8 to 10 issues and will describe the many ways used in machines to control the headwheel.

As a headwheel rotates it produces a tach or tonewheel pulse. Either a photocell or a magnetic pickup is used to indicate that the headwheel has movement. The motors are three phase synchronous, and will run at the frequency of the drive voltage, providing power is not removed from the drive to prevent overspeeding. If a 240 Hz frequency is used at a voltage of sufficient value (100 volts nominal), then the motor rotation will be 240 revolutions per second. Early machines use this drive frequency while later machines use 480 Hz amplitude reduced. Using 480 Hz permits fast acceleration and reducing the amplitude permits the headwheel to run at 240 rps. Still later machines use one drive frequency to accelerate the headwheel and another frequency to run it. Both frequencies are above 240 Hz, but they are constant voltage square waves obtaining power reduction by narrowing the drive pulse width. Next month I will describe 3 methods used to accelerate a headwheel from stop to 240 rps.

Notes on Lock Logic

Introducing headwheel lock logic to the control track divider by four circuits in an RCA machine can give the capstan servo immunity from dropout, as follows:

A. The headwheel lock bus is developed by coincidence of tape and house vertical. An extra pulse or so will not cause unlock in this circuit.

B. Dropouts frequently cause sync separators to produce extra "vertical" pulses.

C. Any pulse present in the capstan servo will reset the control track dividers and can cause enough disturbance to unlock the capstan servo.

D. Shutting the capstan reset pulse off after headwheel lock is achieved will permit full capstan phasing and rephasing, and give the capstan good immunity from dropout.

In the next issue, documentation for this modification will be provided. Please do keep the questions and comments coming.

Simplified operation of the TRC-15A

by Harold Hallikainan/ Hallikainan & Friends

San Luis Obispo CA...The Moseley TRC-15A is a time-proven remote control in operation at many stations. A minor operating inconvenience can be easily eliminated by adding one part to the TRC-15A.

As supplied, the 'Calibrate' and 'Zero' controls interact. When performing the routine adjustments to compensate for system gain and offset drift, the operator must repeat the zero and calibrate adjustments several times, as adjustment of one affects the other.

The problem is that the calibrate control adjusts the pulse width on the monostable of the pulse counting FM discriminator. Adjusting the pulse width causes a variation in the gain of the discriminator (which is the desired effect) and causes a variation in the "center frequency" of the discriminator. The center frequency variation causes the interaction between the two controls.

The solution to the problem is to provide independent control over the gain and offset. The present zero set control does provide an independent control of offset. An independent gain control can be achieved by wiring the calibrate control across the meter. As the resistance of the calibrate control is decreased, the system gain is decreased, with no effect on offset.

(Continued on page 23)

BEE now 'down under'

Arlington, Va...

We are pleased to announce that Audio Telex Communications PTY Ltd has secured the Australasian rights to BEE. Audio Telex plans to mail copies to selected broadcast stations and studios throughout Australia and New Zealand on a monthly basis.

Audio Telex is well known throughout Australia in the broadcast, industrial and educational industries, where they market a wide range of Telex, Magnecord, Bogen, Techcraft and Atlas Sound products.

The General Manager of Audio Telex, Mr. Rod Craig, is delighted with the company's decision to handle the Australian rights to BEE. "As well as arranging the sale of products from the USA listings, for Australian Broadcasters, which will appear in each issue of BEE," said Mr. Craig. Australian broadcasters are invited to send their listings to Audio Telex Communications:

Sidney (Head Office)

54 Alfred Street,
MILSONS POINT 2061
Tel: 929.9848

Melbourne

7 Essex Road,
MT. WAVERLEY 3149
Tel: 277.5311

Brisbane

394 Montague Road,
WEST END 4104
Tel: 44.6328

BEE expands internationally, again

Editor's Note: As many of you know, BEE has been providing a service which would be of great value to broadcasters outside of the United States. The problem is the cost of foreign delivery (airmail) compounded by developing a mechanism whereby the foreign reader can access the listings easily and quickly. In an effort to overcome this, IMAS Inc, publisher of BEE, is in the process of negotiating the international rights to BEE with established broadcast distributors and/or manufacturers in various countries. The concept is simple. the local distributor buys the rights to BEE and sponsors subscriptions for all the broadcasters in his country. He then acts as the import agent when one of his readers becomes interested in a given item, with IMAS Inc acting as the export agent when necessary.

Proposal for digital

by Edwin W. Engberg/
Ampex Corp

Redwood City... Engineers at Ampex Corporation are currently evaluating various digital audio recorder formats. The needs of the professional recording industry have guided this evaluation of formats to determine their reliability in typical operating environments, their capability for current and future operating requirements, and their potential for technological growth in the future. This has led us to the development of a digital audio recorder format that can serve as a basis for a standard throughout the industry.

Two approaches were initially considered: Rotary head techniques such as those used in home and broadcast television (video) recorders, and fixed head techniques similar to those used in conventional analog audio and instrumentation recording. The choice was made for a fixed head, longitudinal digital recorder format so as to provide multichannel (more than four channels) recording capability and high resolution manually directed editing within the recorder at no additional cost. To explain the advantages of this format, let's first describe the data rate requirements of a digital audio channel.

Data Rate

For professional recording usage the bandwidth of an audio channel should be at least 20 kHz. Sampling theory dictates that the sampling frequency must therefore be at least 40 kHz. To prevent unwanted signals (aliasing products) from "folding down" from the sampling frequency into the bandwidth of the audio channel, the input audio signal must be filtered to remove all frequencies above one-half of the sampling rate.

This is the job of an input (anti-aliasing) filter. Practical limitations in the implementation of input filters requires that the sampling frequency be slightly higher than that required by theory. Room must be given to allow the filter to roll-off the response from minimal attenuation at 20 kHz to at least 60 dB at one-half of the sampling frequency.

Consideration for synchronization of digital audio recorders with future digital video recorders led to the choice of 50 kHz as the sampling frequency. The value of each sample is represented by a binary number of 16 bits. This provides a maximum dynamic range of approximately 96 dB when using a linear encoding representation. Both the 50 kHz sampling frequency and the 16 bit linear sample representation has been endorsed as a potential standard by the Digital Standards Committee of the Audio Engineering Society.

The product of 50 kHz and 16 bits results in a bisic digital audio data rate of 800 Kb/sec. When this basic data rate is to be recorded. additional data called "overhead" must be added to allow format synchronization, data error detection and data error correction.

When this is added to the basic audio data rate in the Ampex format, the composite (formatted) data rate becomes 1.6 mb/sec. To provide economical usage of tape and allow conventional recording time per reel of tape, 30 in/sec was chosen as the maximum recording speed. With a data rate of 1.5 mb/sec and a tape speed of 30 in/sec, the recorded bit density becomes 50 Kb/in. This is a bit-to-bit spacing on tape of 20 micro-inches. By comparison, an analog recorder that records a 20 KHz sine-wave at 30 in/sec creates a wavelength on tape of 1,500 micro-inches., a difference of 75 to 1.

Experience at Ampex with digital instrumentation recorders has shown that for typical audio recording environments the recorded bit density should not exceed 25 Kb/in. Therefore we have chosen to divide the composite data rate of 1.5 mb/sec between two tape tracks to achieve a data rate per track of 750 Kb/sec and a recorded bit density per track of 25 Kb/in. The short wavelengths recorded in a digital audio recorder significantly influence practical editing techniques.

Editing

During playback the recorded signal amplitude decreases at the rate of 55 dB per wavelength of separation between the tape surface and the reproduce head gap. A 25 Kb/in recorded density results in an effective wavelength of 80 micro-inches. To minimize spacing losses, the head-to-tape contact must be held less than 10 to 20 micro-inches. fingerprints can easily cause a spacing of 100 micro-inches, and smoke particles are typically 25 micro-inches in size. Because of the problem of preventing tape contamination, we believe mechanical splicing techniques will not be considered practical for professional recording applications. Instead, editing mechanisms such as those now used in the production of video tapes will become the accepted and desired procedure.

The new format is specifically configured to provide the capability of manually directed machine edits, such as punch-ins and edits directed by an automatic system. In this new format the recorded entrance and exit points of edits are executed without destroying or disturbing audio data before, during, or after the edits.

Our mechanism to provide these editing features is to format the recorded data into blocks on tape with defined gaps between them that are used to go into and out of record without destroying audio data. This is the same technique used in computer disk and tape drives.

Block Requirements

Both physical and electrical considerations led to the final choice of block repetition rate. Data drop-outs which occur must be prevented from destroying the recorder's error correction mechanism. This requires that the block be physically long enough on tape so the data is adequately dispersed within the block. This is counterbalanced by the need to repeat the blocks often enough so that there are physically at least two blocks between the reproduce and record heads. This provides for processing of the audio data contained within a block, both within the recorder and within an auxiliary electronic processor, for subsequent re-recording into the same block space as it passes the record head. This feature is necessary to maintain absolute

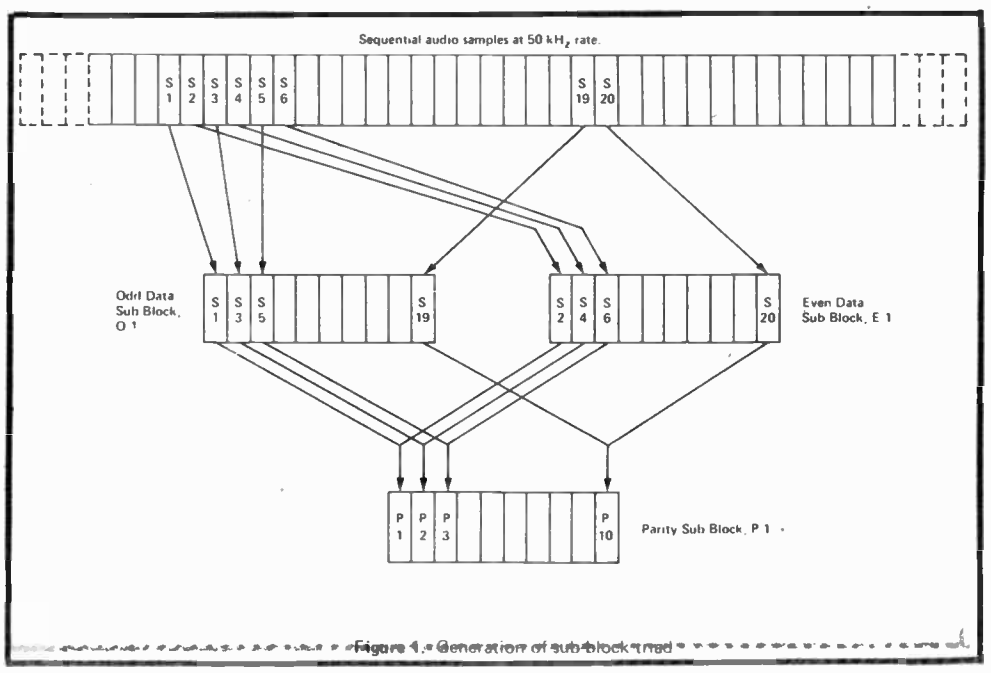


Figure 1. Generation of sub-block (rad

audio standard

timing between channels of a multi-channel recording during editing procedures. The block repetition rate chosen is 250 Hz.

Sub-Block Description

A pictorial representation of the electrical process used to format the basic audio data is shown in Figure 1. An analog to digital (A/D) converter, either within the recorder or without creates a 16 bit binary number every 20 micro-inches (50 kHz). The top of Figure 1 represents the continuous generation of these numbers. To aid this explanation, let's label one of these 16 bit numbers (one sample) S1. This will be the first in a series of 20 samples labelled S1 through S20. The first sample, S1, is placed in the odd sample sub-block, 0-1. The second sample, S2, is placed in the even data sub-blick, E-1. Likewise S3 is placed in 0-1 and S4 in E-1. This continues until all 20 samples have been divided between 0-1 and E-1. Each data sample contains 16 bits and each sub-block contains 10 samples so therefore each sub-block contains 160 bits.

A third sub-block, called the parity sub-level, is created by sequentially comparing the bits in 0-1 with those in E-1. For example, the first bit in 0-1 is compared with the first bit in E-1. Remember that a binary bit can have only two values, a "one" or a "zero." If both bits are the same value, a "zero" is placed in the first bit position of the parity sub-block, P-1. If they are different, a "one" is placed in P-1. This continues on a bit-position basis until all 160 positions have been filled. The result is a sub-block triad consisting of 0-1, E-1 and P-1.

The next 20 samples will also be divided into a triad. Ten of these triads are then used to create the data block.

Tape Format

The ten sub-block triads that make up the data block are divided between two tape tracks as shown in Figure 2. Tape track A is separated across the tape from track B by at least one track width to insure that typical single event drop-outs can only effect one track of the two-track pair.

Tape track A contains the odd data sub-blocks and track B the even data sub-blocks. Note that the parity sub-blocks are shared between the tracks, with P-1, P-3, P-5, P-7 and P-9 on track A and P-2, P-4, P-6, P-8 and P-10 on track B. This is important for error correction reasons that will be explained later.

Also included in the data block is synchronization and error detection information. It is possible that when a major drop-out occurs, the recorder's electronics may lose synchronization with the format on tape. Synchronization must be regained as soon as possible to minimize any additional loss of data. To insure rapid recovery, a 12 bit pattern is inserted at the beginning of each sub-block. This pattern is unique and cannot naturally occur in the audio, parity, or error detection data. A synchronization pattern thus occurs approximately every 0.25 ms.

Just as it is necessary to re-synchronize after a dropout, it is also necessary to quickly and unambiguously detect the data errors resulting from drop-outs; it is only *after* detection that errors can be corrected or concealed. A 12 bit error detection character is added to the end of each sub-block and thus occurs at the same rate as the synchronization pattern. This character is in the form of a cyclic redundancy check character (CRCC). The CRCC is the result of arithmetically dividing the data in the sub-block by a binary polynominal.

Actually, this is a conventional error detection technique and much simpler to accomplish than to explain. But stated simply, error detection is accomplished by again dividing the data by the polynominal during playback. If the remainder from this division matches the remainder represented by the CRCC, there is an extremely high probability that no errors occured during playback in either the data or the CRCC. If an error burst occurred and that burst was less than 12 bits in length, the errors will be unconditionally detected. If the burst error is exactly 12 bits long, the probability of the error going *undetected* is one in 2048. For burst errors longer than 12 bits, the probability of *undetected* errors is one in 4096. This gives a potential to improve the recorders basic bit error rate by 5000 to one if all detected errors are corrected.

Figure 3 shows the construction of the data and parity sub-blocks. The inter-block gap (IBG) that separates the data blocks and is used to go into and out of record without destroying audio data also contains a synchronization pattern and error detection character. The IBG can in the future contain non-critical and generally repetitive information such as time code, data block identification, or editing information.

The data is recorded on tape in the form of M² code, an Ampex-developed code that is self-clocking and DC free to match the recorder's fundamental lack of DC response. Each track has a recorded data rate of 750 Kb/sec. The distance from one IBG to another is 0.12 inches and each IBG is 9.6 mils long.

Consideration for providing a good signal-to-noise ratio operating margin for the basic digital channel, together with concern for tape guiding accuracy and intermachine compatability, limits the minimum tape track width to 15 to 20 mils. This format provides 4 audio channels on ¼-in tape, 8 channels on ½-in, 24 channels on 1-in, and 48 channels on 2-in. In addition, one track is provided in the ¼-in configuration and two tracks are provided in the ½-in, 1-in, and 2-in configurations that can read data in all tape transport modes for time code or other utility purposes.

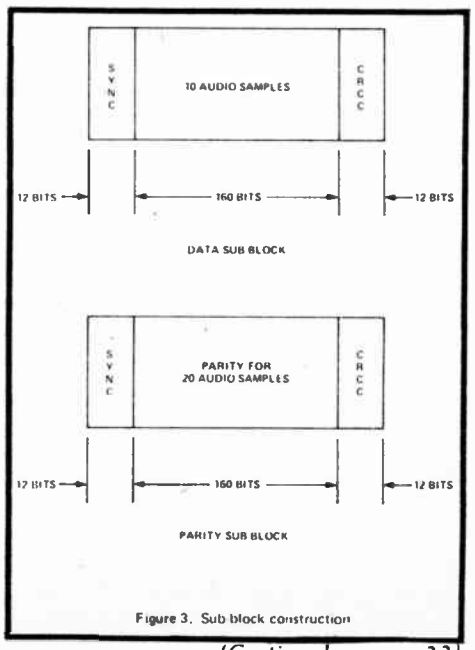


Figure 3. Sub block construction

(Continued on page 22)

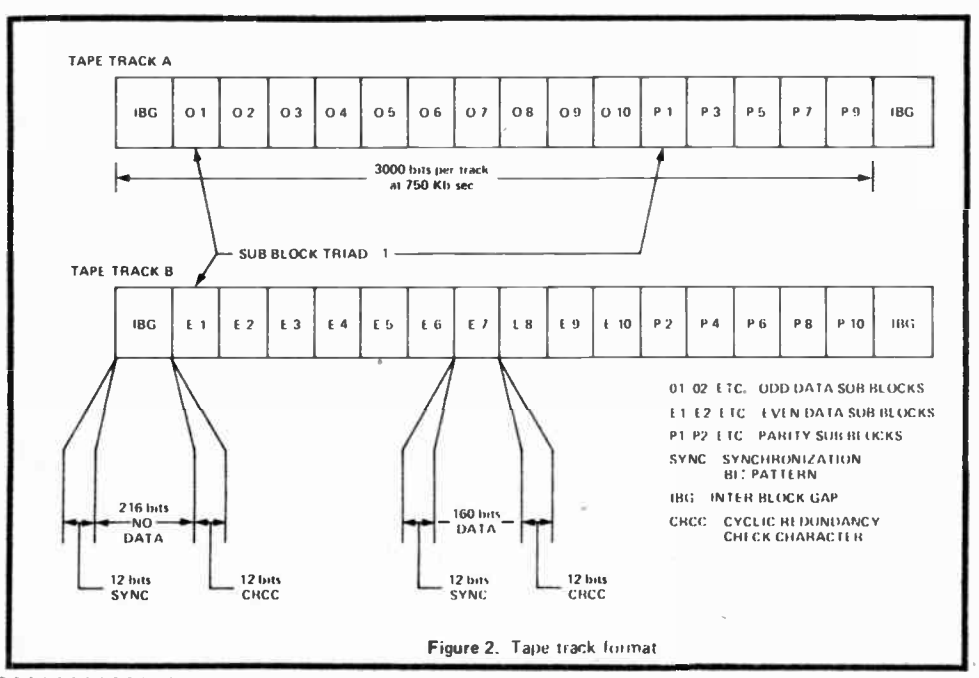


Figure 2. Tape track format

New product and literature releases

Compression Driver

James B. Lansing Sound, Inc announces the 2441 professional series compression driver, offering extended bandwidth and improved power capacity. The suspension of the driver employs a new JBL-developed surround pattern (patent pending) consisting of three-dimensional diamonds. The diamonds reduce binding stress and provide predictable frequencies for the second and third Eigentones, in addition to the basic suspension resonance. As a result, frequency response of the 2441 is extended approximately one octave beyond that of its predecessor, the 2440.

Contact: James B. Lansing Sound Inc.
8500 Balboa Blvd
Northridge CA 91329
213-893-8411

Cable Guide

Bonded and laminated flat cable are described in a new guide published by **Belden Corp.** Also covered in the 8 page illustrated booklet are bulk and prestripped flat jumper cable and custom cable assemblies. The publication, No. ED79-1, describes the space-, weight-, and cost-saving applications. Specifications and technical data are presented. For a free copy while supplies last, contact Belden.

Contact: Belden Corp
2000 S Batavia Av
Geneva IL 60134
312-232-8900

Inverter

Vanner Inc has developed a highly regulated 1000 watt DC to AC inverter for mobile vehicle operations. The unit is over 90% efficient and capable of driving all on-board equipment including such installations as a ¾ inch cassette recorder, sync and color bar generator, etc. Normal draw, with everything on, is between 6 and 7 amperes at 120 volts. The RMS voltage, amperage and frequency are so well regulated that no additional filtering is necessary. Special features of the Vanner-Verter Model 20-10 are small size, light weight and noiseless operation.

Contact: Vanner Inc.
Box 5816
Columbus OH 43221
614-488-3331

Intercom Systems

Clear-Com announces the development of its new RS-202S 4-Channel Remote Intercom Station. This station is ideally suited for specialized application in the Broadcast/EV, Theatre and Audio fields. The RS-202 consists of two discrete intercom channels and two listen only program channels that are mixed in the remote station and fed to binaural phones. Channel 4 Intercom and Program to one ear, and Channel B intercom and Program to the other ear. Two separate mic on/off switches along with the listen volume controls allow for nine possible combinations of talk/listen functions.

Contact: Clear-Com Intercoms
759 Harrison Street
San Francisco CA 94107
415-989-1140

Fresnel Lens Spots

A new line of fresnel lens fixtures has been introduced that is much smaller and lighter than any previous fixtures of this type. The new units, manufactured by **Ianiro** in Italy, are called "Bambinos" because of their small size. The are available in 2000-watt, 5000-watt and 10,000-watt configurations. The 2000-watt Bambino has a 6 inch fresnel lens, the 5000-watt has a 10 inch fresnel lens, and the 10,000-watt Bambino has a 14 inch fresnel lens. The new Bambino line will be available at leading rental houses everywhere.

Contact: Strand Century Inc
20 Bushes Lane
Elmwood Park NJ 07407
201-791-7000

BEE offers new employment service

Arlington VA... Effective immediately, IMAS Inc, publishers of BEE announce a new employment service for broadcasters. Within the BEE classified section two new categories have been opened, one for "Help Wanted" and one for "Positions Wanted." These new categories are meant for technical positions ONLY (BEE will not accept sales management openings, etc) and can be used by individuals and companies alike. The service will operate in the following manner:

For Help Wanted

Any company or station can run technical Help Wanted ads at the flat rate of $12 per insert (up to fifty words maximum accepted), per month. Payment is required with the insertion. There will be no invoicing. Blind box numbers can be provided at an extra charge of $10 per listing, and responses will be forwarded to the listee, unopened, upon receipt.

For Positions Wanted

Any individual can run a Position Wanted ad, FREE of charge, at any time. Simply send in your listing (50 words maximum) and it will appear in the following 3 issues. Contact information will normally be provided, but if a box number is required, there is a $10 fee which must be paid with the listing (there will be no invoicing). Responses will be forwarded to the listee, unopened, upon receipt.

Why a New Service

According to Steve Dana, BEE Publisher, this employment service is a natural expansion of the type of service BEE has been providing to broadcasters, and he expects favorable response from BEE readers. The idea itself was brought up by a number of people in the industry who have complained about their inability to reach the technical audience effectively. John Delantoni of Orban put it bluntly when he said, "We have a hell of a time trying to find an advertising media with which to advertise our job openings." Well, John, no more.

TELEVISA places large Ampex order

Redwood City CA... Ampex has announced it has received an order from Televisa, S.A., of Mexico City for more than 40 VPR-2 and VPR-20 helical scan videotape recorders worth approximately $3.0 million.

Ronald Ballintine, president of Ampex International, said Televisa also has an option to purchase an additional 10 VPR-20s and five VPR-2s. Televisa, Mexico's largest television network, will install the new equipment at its two major production facilities in Mexico City. The new systems will be used to expand

(Continued on page 23)

Aviso Importante

Para Radiodifusores de Mexico!

Usted ahora tiene acceso a la lista de equipo de radiodifusion mas extensa en el mundo.

Ofrecemos mas de 1,000 referencias en cada publicación.

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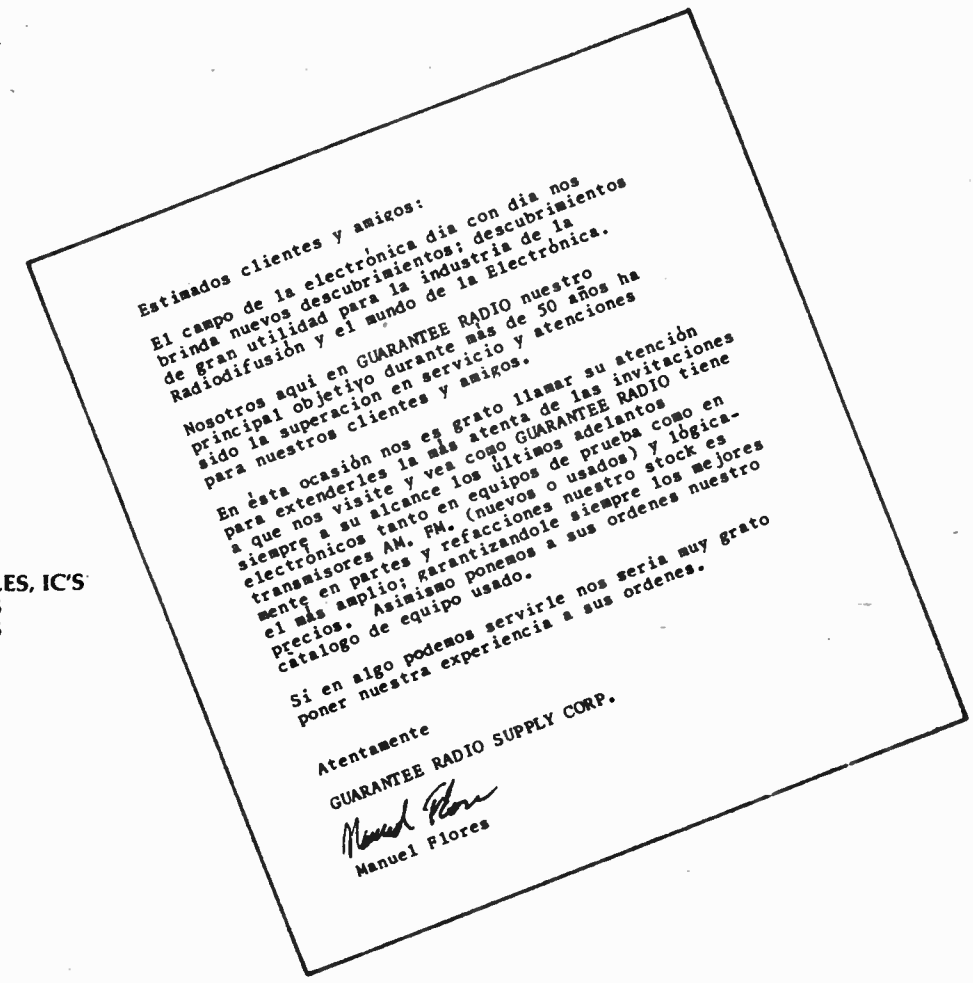
Con esta extensa seleccion. Guarantee Radio le permite comprar equipo de uso con la misma facilidad como si lo comprara nuevo.
Examine nuestra lista y convénase de que este servicio que le ofrece Guarantee Radio le ahorrara largas horas y dinero en su búsqueda de equipo usado.

Para mas informacion, incluyendo precios llamenos al telefono:

512-723-6913



Estimados clientes y amigos:

El campo de la electrónica dia con dia nos brinda nuevos descubrimientos; descubrimientos de gran utilidad para la industria de la Radiodifusión y el mundo de la Electrónica.

Nosotros aqui en GUARANTEE RADIO nuestro principal objetivo durante más de 50 años ha sido la superacion en servicio y atenciones para nuestros clientes y amigos.

En ésta ocasión nos es grato llamar su atención para extenderles la más atenta de las invitaciones a que nos visite y vea como GUARANTEE RADIO tiene siempre a su alcance los últimos adelantos electrónicos tanto en equipos de prueba como en transmisores AM. FM. (nuevos o usados) y lógicamente en partes y refacciones nuestro stock es el más amplio; garantizandole siempre los mejores precios. Asimismo ponemos a sus ordenes nuestro catalogo de equipo usado.

Si en algo podemos servirle nos seria muy grato poner nuestra experiencia a sus ordenes.

Atentamente

GUARANTEE RADIO SUPPLY CORP.

Manuel Flores

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RCA TRANSISTORS, MODULES, IC'S
RCA TRANSMITTING TUBES
RCA TRANSMITTING PARTS
RCA INDUSTRIAL TUBES
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AMPLIFIERS

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***Spotmaster AD-1B** Audio D.A., 1 in, 5 out, excel. cond. $256. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***McMartin TBM-2500 RF amplifier**, good cond. Key Code 5-27.*

***Dolby (B Type) Model 334** FM Broadcast Unit, stereo, (noise reduction Unit), excel. cond. $795. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Gates M6Z44 pre-amplifier**, two available, good cond. Key Code 5-27.*

***Spotmaster PLA-20/Marti PGM-20** line amp, mint cond. $95. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Mc Intosh MC-250**, 50W. Stereo Amp., excel cond. $275. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Gates M6442 pre-amp**, two available, good cond. Key Code 5-27.*

***McMartin LT-80-B**, (4). $75 each. Key Code 5-95.*

***Dynair DA-230A** Video D.A., 1 in, 4 out, like new $175. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Fairchild/Robins DA-1520**, Audio D.A., 1 in 15 out, good cond. $195. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

Phono Preamps stereo. New 7 available at $12. each. Key Code 2-64.

McIntosh ML40 (tube). Good condition $150. Key Code 4-44.

Harris Audio line amplifiers, (quantity-2). Key Code 4-74.

Sony 100 watt stereo amp in road case. Used by former Beach Boy for instrument amp. $500 or best offer. Key Code 4-85.

RCA BA44B monitor amplifiers, quantity-2, $35 each. RCA BR22B shelf $25. Key Code 4-18.

Gates Radio Gain Set Model M-3625. Key Code 4-40.

Ampex 620 Amplifier/speaker unit w/carry case. Includes spare parts, solenoids, mike transformers etc. Key Code 4-63.

Langavin M130 amplifiers $10 each. Key Code 4-49.

McIntosh MC5Q 50 w mono amp., good condition, $125. Key Code 4-46.

Tunnel Diode pre-amplifiers. 15DB gain, 5DB noise figure. Used. 2 available. Will sell or trade. Key Code 3-13.

Don McGohan MG-20B audo amplifier. 20 watts. Best offer plus shipping. Key Code 3-5.

Altec 1567A, mixer-amp. $100. Key Code 3-52.

Stromberg-Carlson AP-50, 50 watt tube type audio amplifier. Two available in working condition. Best offer plus shipping. Key Code 3-5.

Newcomb H-50, audio mixer amplifier. 3 microphone inputs, low Z, 1 phone input. Best offer plus shipping. Key Code 3-5.

Collins 6X-1, tube-type audio monitor amplifiers. $20. Key Code 2-1.

WANT TO BUY

***Turntable preamp**, working, reasonable price. Key Code 5-58.*

***Marantz Model 5**, any condition (need one). Key Code 5-8.*

McIntosh MC-60 tube amplifier. Key Code 4-58.

Peak limiting amps. Used condition, will repair if necessary. Key Code 4-41.

Langevin model 5117 amplifier mounting trays, need two. Key Code 4-80.

Pre-amp for Mono Turntable. Minority College Radio Station, will accept donations. Key Code 3-86.

Power Amps, tube type. Any condition. Cheap. Key Code 3-42.

RCA Amps and Preamps. BA-1 through BA-12 series, also need rack shelves. Key Code 3-40.

Collins 12Z or similar, remote amps. Key Code 3-42.

ANTENNAS & TOWERS

WANT TO SELL

***Jampro 4 bay FM antenna**. Key Code 5-36.*

***Collins 4 bay FM antenna**. Key Code 5-36.*

***Guyed Tower**, 150 ft, on ground, good condition. $800. Key Code 5-11.*

***Andrew 10.7-13.2 GHz rigid waveguide** type WC-109, (54346-240), new, unused, w/hardware, 190 feet, best offer, plus shipping. Lists at $2,544. Key Code 5-31.*

***Utility Tower 200 ft. guyed Type 2201**. Key Code 5-36.*

329 feet Andrew 1⅝" HJ7-50A Heliax with connectors. Good condition. Key Code 4-43.

Jampro JA-2V/2B w/power divider 2H, 2V bays, tuned to 96.7 MHz. Need to replace 2 inner bay cables. Key Code 4-42.

Windcharger tower, 300 feet, with 20 ft. pole at top. Lights and wiring for lights and deicers. Tower to be available on the ground April 1, 1979. Key Code 4-43.

Tower lighting chokes. 3 Wire, 2000 watts AC. Some new, some used. Some used available in weatherproof metal boxes. 6 available $25-$100. Key Code 4-24.

Crouse-Hinds Tower light flasher unit. Mercury bulb type. In working condition, but dirty. $25. Key Code 4-24.

Gates 23-A tower lighting choke. 2 wire open type. $55. Key Code 4-60.

Parts chassis. Were part of antenna switching-failsafe system. Many relays, latching relays, small AC contactors, indicators, etc. Well worth $15 each: Key Code 4-24.

Shively 6810 CP Antenna. 8 Bay tuned to 101.1 and 102.1 used for duplexing. Deicers open. Key Code 4-12.

Harris FMC-2, Two Bay FM Broadcast antenna with deicers, tuned to 100.9 Mhz. Excellent condition. Station moved to new frequency. Key Code 4-43.

Galvanized Steel Tower. 208 foot heavy duty, 3-leg, for TV, FM etc, complete. On ground, $12,500. Key Code 3-2.

Jampro JZZ-2DA, channel 48 antenna. Rated 65 KW input. Key Code 3-33.

Andrews Heliax HJ7 50A, 1⅝" conduit copper with black covering. Dielectric conduit 45 ft. $90. For fast sale. Conduit is 8 months old. Buyer must arrange to pick-up, pay freight. Key Code 3-89.

Transmission Line, 400', 1⅝" air heliax. Key Code 3-14.

CFM Automatic Dehydrator. Dielectric, $500. Key Code 3-96.

Andrew HJ8-50A copper Heliax, 3" dia. 120 ft. total length with Andrew splice at 100 ft. One 3" flange. $9/ft., sold as one length. Key Code 3-12.

Transmission Line, 6⅛", 75 ohm. SWR. Inc; K-Line, two years old, all hangers. etc. Key Code 3-33.

CCA FM-LP-2, 2 section antenna. Circular polarization. Key Code 3-87.

FXA 14-50J, phase stablized sampling line. ¼" foam., 6 reels 875' each. Unused. Key Code 3-88.

CDR CR-44, industrial-grade antenna rotor. Brand new in sealed carton. 25% off net. Key Code 3-12.

CCA FM-LP-2, 91.5 MHz, 2 section. Key Code 3-14.

Base Insulators for self-supporting tower. Four at $40 each. Key Code 3-96.

Harris-Gates FMC 6 circularly polarized 6 bay FM antenna. Heavy duty three and one-eight inch line included. Will take high power. Presently tuned to 93 MHz. Good condition. Key Code 2-17.

G-800, guyed stainless tower. 127 feet, 7 feet cross section. $2,500 or offer. Key Code 2-32.

WANT TO BUY

***TV antenna for Channel 29 or 45**. Key Code 5-50.*

***Six bay antenna** or four vertical antenna for 106.1 with power divider. Key Code 5-51.*

***Wincharger Type 101** tower or 20ft sections of Type 101. Key Code 5-36.*

***Collins 37M-8** antenna tuned to 99.1 MHz with 1-⅝" coax or other horizontally polarized antenna, 6 or 8 bay on 99.1 MHz in good cond. Key Code 5-38.*

Bays (stacks), quantity-2, Ch 12 Alford Stand-antennas would take ch 11 or 13. Key Code 4-22.

300' ⅞" diameter foam filled coax with ⅞" flanges. Key Code 4-67.

FM Circularly polarized 4 bays tunable 88 to 90 Mhz, that will accept 1KW R.F. Maximum. Key Code 4-38.

Parabolic dishes, 8 feet or larger. Any condition. Key Code 4-47.

1⅝ to ⅞" taper reducer. Key Code 4-67.

FM Antenna, 10 or 12 bay, high power circular polarized for transmitting. Key Code 3-81.

Phasing Unit for 4 tower directional. 10 KW on 1110 KHz. Key Code 3-94.

Parabolic Dish Antenna 10 ft. or larger in nearly any condition. Key Code 3-10.

Air Dielectric Coaxial Cable, 3" or larger. 500' needed. Key Code 3-81.

300' Tower, suitable for AM-FM. Key Code 3-92.

Heliax ⅞ inch or equivalent. Small length 30-50 feet. Key Code 3-10.

Channel 14 TV antenna. Key Code 3-34.

Guyed Tower, 300' for CATV head end. At least a 33" cross section. Key Code 3-74.

220' Towers, 4 each. Tuning houses, 4 each. Key Code 3-94.

AUDIO PRODUCTION (OTHER)

WANT TO SELL

***MX-12 Sony mixers**. Attenuation, pan, stereo-mono switch, hi-lo inputs and in mint condition. Quant 2 at $80 each. Key Code 5-86.*

***MXR Compander** Noise Reduction Unit, $75. D. Abercrombie, Coyote Sound, 4318 Pan American Frwy. NE, #252, Albuquerque NM 87107. 505-883-0163.*

***Custom built 8-track** cartridge loop mixer. Used to record a stereo mix onto an 8-track master loop (1" tape). $500. Key Code 5-95.*

***Dolby A301**, good cond, two available at $500 each. Key Code 5-33.*

***Spotmaster, sound brightner**. CLE-500 compressor-limiter-expander. Excellent condition. Quant 2 for $500 each, or both for $900, or best offer. Key Code 5-84.*

***Ampex AM 10 mixer**, good cond, $350. Key Code 5-33.*

Ampex MX-10 stereo mic. mixer, excel. cond. $325. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.

***Fairchild 658A** reverb-rarely used, good cond. Key Code 5-27.*

***Orban Optimod F.M.** in exc. cond. Key Code 5-34.*

***Kepex module with enclosure and manual**. New, still in original package. $290. Key Code 5-15.*

***Garron Phase enhancer**, Model STE-100. $400/offer/trade for stereo modulation monitor/or???. Key Code 5-41.*

Magna Tech model 31 Compressors, good condition, $200 each. Key Code 4-44.

Inovonics, Orban, Technics, DBX, Lexicon Eventide, production tools, equalizers, reverb, limiters, amplifiers, monitor speakers, digital delay, broadcast mixers and more. New, demo and used equipment. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel. 608-257-7722 or TWX 910-268-2745.

DBX Noise Reduction (2 model 154), 8 channels. $1200. Key Code 4-3.

RCA OP-7 Remote Mic Mixer $40. Collins 212-Y remote amplifiers good cond., $20. each. Key Code 4-49.

Urei 527-A graphic equalizer, excellent cond. $450. Key Code 4-25.

Lang PEQ2, solid state program equalizer, like new. $225. Key Code 4-33.

Audio snake cable, 65' 12 pair w/box, never used, $155 or best offer. Key Code 4-46.

Heavy duty cable, ¼" phone plug ends, 20 & 50' lengths, also lo-Z mike cable. Key Code 4-46.

Ivie Audio Analyzers, IE-30s and IE-10s in stock. Triad Productions Inc, 1910 Ingersoll, Des Moines IA 50309. 515-243-2125.

Orban parametric equalizer. Rack mount, 2 channel. $637. Only a few hours use. Key Code 4-85.

Shure M675 Audio Master. Two available, Key Code 3-65.

Garron STE 100 phase enhancer. New. $500. Key Code 3-88.

WANT TO BUY

***Tape delay**. Electronic delay or cart. Key Code 5-19.*

EMT 140, mono or stereo. Key Code 4-21.

Audio switcher (stereo) for studio minimum 5 in x 4 out, illuminated. Key Code 4-81.

EMT 140 Reverb plates, mono or stereo, EMT 240 gold foil reverb. Key Code 4-83.

Quad Eight NS-120: Noise Gates (in any condition for good price). Key Code 4-10.

DBX 160 Compressor/Limiters. Key Code 4-10.

Urei, 1/3 octave or Altec Graphic Equalizer. Key Code 4-88.

Pre-1950 consoles, turntables, equalizers, microphones, amplifiers, etc. Also Pre 1950 Hi Fi equipment. Key Code 4-33.

New or used boards, equalizers, limiters, amps, etc. Needed immediately. Key Code 4-65.

Monitor Speakers, large and old. Any condition. Cheap. Key Code 3-42.

Cobraflex, W.E., Altec, E.V. or other midrange horns and drivers. Cheap. Key Code 3-42.

Burwen DNF 1000 in perfect condition. with manual. Key Code 3-93.

AUTOMATION EQUIP.

WANT TO SELL

***SMC, DP-1 system**, 4 each 250 carousels, 4 each Revox 77, time announce, remote control, teletypes & encoders. Good cond, & in service. Key Code 5-55.*

***Harris SP-10 Automation System** (complete) (no tape or cart eqmt), with manuals. Best offer. Key Code 5-89.*

***SMC 20 Hz High Pass Filters**. Key Code 5-94.*

***SMC Spotter parts**. Send for list. Key Code 5-94.*

Autogram, all stereo, 2 carousel-R.A., 1 carousel-seq., 1 SMC PB cart, 1 SMC RPB cart, source brain & extras. Key Code 4-32.

SMC TAC-1 Time Announcer control with time announcer deck used 18 months. $500. Key Code 4-45.

SMC Time Announce unit. 18 months old, in service 14 months. Works very well. Does not fit new format of station. Key Code 3-21.

Gates TS-3 time selector. Complete, though needs minor work. $100. Key Code 3-12.

SMC Time Announce. Complete. Key Code 3-18.

Harris SC-90 control console. Now in service and working well. Key Code 3-25.

SMC SSP 30-60 stereo automation with 3 carousels, random select, 4 Scully 270s, logging with 33RO. $9000. Key Code 3-49.

Gates SP-10 automation programmer control unit. Operable, but needs some work. $150. Key Code 3-12.

Scully 270 reproduce decks. One-half track stereo. $1400. Key Code 2-2.

WANT TO BUY

ITC 750 series reel play back deck. Key Code 4-16.

Random Select Carousel, late model, 350 series mono. Quantity, 1 or 2. Key Code 4-16.

Schafer 800-T Stereo with at least 2 reel to reel playbacks, 2 R.S. Carousels. 2 single deck cart playback and time announce. Key Code 4-25.

BROADCAST EQUIPMENT EXCHANGE

ACTION-GRAM

MAY 1979
USE BEFORE
AUGUST 1979

Instructions: Use this form to take advantage of any of the services provided by *Broadcast Equipment Exchange*. Always fill in the Contact Section below first, then fill in the appropriate service section(s). Remember, BEE provides a FREE listing service for end-users. Listings are printed *without* the listee's name and address... A Key Code is used instead. Paid subscribers receive their issues of BEE with the matching Key Code list. Non-paid subscribers do not; they pay for the Key Code only when they order it (see the Subscription Section below).

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...our Hot Line telephone number. When you call, we will give you any Key Code names and addresses and send you the full list with an invoice for $5.

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☐ Check enclosed for 3 BONUS issues!

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☐ Free without the Key Code list (I'll buy the list for $5 only when I need it).

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AUTOMATION...WTB...CONTD.

Gates or SMC System, with 4 reel decks and 2 carousels. Key Code 3-92.

Programmer, 3 carousels, 2 reel to reel decks and 25 Hz detectors. Key Code 3-43.

Gates 55 or similar automation sequencing control cartidge playback. Key Code 3-58.

CAMERAS (VIDEO)

WANT TO SELL

***Ikegami HL-77A** w/13:1 lens, 3 mos. new. Key Code 5-42.*

***RCA Vidicon Cameras**, MI-3623A, $75 ea, $120 or best offer for two. Key Code 5-8.*

***RCA TK-60** with lenses, no CCU, gd cond, best offer. Key Code 5-47.*

***Varotal V**, F4, 40-400 manual zoom lens with control, best offer. Key Code 5-47.*

***Hitachi/Shibaden FP100D**, B & W cameras, 2 each, 10:1 lenses, cables, sync gen, CCU's cases, and manuals, reasonable. Key Code 5-57.*

***Sony AVC-4000A** monochrome camera with 5-1 zoom lens and manual, perfect, $750 or best offer. Key Code 5-68.*

***RCA TK-42**, 3 each, complete with manuals, sealed bid for opening June 20. Mark envelope "TK 42 Bid". Minimum $750/each F.O.B. Further info on request. Key Code 5-48.*

***RCA TK-60A** studio B/W cameras, 2 each, zoom lenses, fixed lenses, manuals, many extras, in perfect shape, work gd, $1250 or best offer or trade. Key Code 5-68.*

***TK-42** camera. Best offer. Key Code 5-25.*

Hitachi FP1212 plumbicon camera $8,500. Hitachi FP1100 Chalnicon camera $4,500. Both $12,000. Key Code 4-26.

Sony DXC-1200 vidicon color cameras, quantity-2. Key Code 4-37.

Hitachi FP-1500 color vidicon camera. Key Code 4-37.

Sony DXC 1610, modification for playback through camera, $2750. Key Code 3-71.

Norrelco LDH-1 with 10-1 zoom lens and hard lens for Telecine. Also oscilloscope and tripod. Key Code 3-24.

CEI-280, 2 floor and 1 film chain enhanced. Floor cameras with Angenieux 10 x 1 zoomx, tripods. Key Code 3-32.

Ampex 327-30 b and w studio cameras with cable. Two available at $400 each. Key Code 2-30.

IVC 90 Color Camera with CCU plus 2 parts spares. Good color, working condition and in use. Key Code 2-76.

WANT TO BUY

***Cameras**, old color and black and white with lenses. Key Code 5-40.*

Lens eight inch (203mm) for RCA TK-11. Key Code 4-6.

Portable b/w like AVC-3400 etc. Used or repairable but must be mechanically complete. Key Code 4-61.

CCU, GPL Precision 1000. Any condition with manuals. Key Code 3-52.

Cable for Sony DXC-5000A and DXC-5020. Key Code 3-52.

CART MACHINES

WANT TO SELL

***Spotmaster 5300A** triple-Deck mono PB machine. Brand new motor $950. Key Code 5-1.*

***Gates Cartritape II** playback unit. Out of service for 7 years. Works, best offer. Key Code 5-9.*

***Spotmaster**, 2 available. One Rec and PB, one PB only. Key Code 5-13.*

***Harris Criterion** compact (four). Key Code 5-21.*

***Tapecaster R.P**, in gd. cond, heads like new, $425. Key Code 5-70.*

***Tapecaster stereo 700** in gd. cond, $300. Key Code 5-70.*

***USED and NEW**: Spotmaster, Gates, ITC, Tapecaster, Ampro, etc. Call or send for current information. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

Tapecaster 700RPD Tape Delay unit, $300. Key Code 4-18.

Gates Cartritape II with record amp in excellent cond., $125. Key Code 4-64.

Spotmaster 5 spot cart tape deck w/150 Hz Q circuit. Good cond., recently refurbished. Key Code 4-76.

Record amplifier board for Gates Stereo Criterion. New-$40. Key Code 4-29.

Spotmaster 5301 triple decker mono playback machine. New motor reconditioned, $1100 or trade for good reel-to-reel. Key Code 4-54.

Collins 642, complete or non-working, also record amp for same. Key Code 4-79.

Spotmaster 500C. Key Code 4-1.

Spotmaster 400 mono P/B $75. 405 Mono R/P $150. Both for $200. Key Code 4-87.

Spotmaster stereo play backs, (quantity-2). Key Code 4-74.

Spotmaster stereo R.P. Key Code 4-74.

RCA 4 deck machine. Good condition. Bargain price. Key Code 3-18.

Spotmaster Tape Cartridge Winder TP-1A average, not working condition. Key Code 2-76.

WANT TO BUY

***ITC 3-D** with record, all tones. Key Code 5-49.*

***Rack mounting** for old ATC or Gates Criterion. Key Code 5-49.*

***ITC 303DS** stereo cart machine. Key Code 5-51.*

***Record-Playback** (mono) cart machine, inexpensive. Key Code 5-43.*

***Anything working or close to it**. Preferably not rack mounted, but I'm flexible. Key Code 5-58.*

Mono-play/record/delay 1976-79. Model in good condition. Key Code 4-31.

Cartridge machines. Key Code 4-38.

New or slightly used cart machines, ITC preferred. Key Code 4-65.

Record Delay Unit. Mono, cartridge. rack or table top. Good quality. Key Code 3-56.

Carousels, 3 each and 1 single playback deck. Key Code 3-43.

Record Playback Units, need 2. Minority College Radio Station, will accept donations. Key Code 3-86.

CASSETTE & REEL-TO-REEL RECORDERS

WANT TO SELL

***Ampex 351** Mono, Reconditioned. $1195. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Ampex 351-2** transport rebuilt like new with new capstan and new stereo head stack assembly, $1450. Key Code 5-15.*

***Scully 280 SP**, 2 track recorder, with remote control, exc. cond, $1850. Key Code 5-26.*

***Ampex AG-600** stereo tape recorder, two available, good cond. Key Code 5-27.*

***Magnecord PT6-6** tape recorder, works o.k., except for brakes, $100. Key Code 5-30.*

***Ampex AG440-4** in portable cases with 2 and 4 track head stack, good cond, $3500. Key Code 5-33.*

***Revox A-700**, 2-track recorder, 3 speeds, remote control, exc. cond, $1800. Key Code 5-39.*

***Ampex AG500**, exc. cond, 2 tracks, 7½ and 15 ips, ½ track stereo, $1000. Key Code 5-46.*

***Magnecorder 1024**, needs some work, in cases, quarter-track stereo, 7½-3¾ ips, four heads, $550. Key Code 5-54.*

***Ampex AG 300-4**, walnut cabinet, exc, $1100. Key Code 5-61.*

***Ampex 351-2** tape transport only, $600, gd. working cond. Throw in repairable mono electronics free. Key Code 5-62.*

***Revox B 77** demonstrator, 2 track stereo, 7½-3¾ ips, cabinet, $1200. Revox A 77, 2 track stereo, 7½-3¾ ips, new heads, $700. United Tapes of America, 303-242-0405.*

***Magnecord 1028-24** Stereo 2T, 7.5-15, excel cond. $750. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Ampex 351** full track recorder, new heads, exc. cond, $1100. Key Code 5-26.*

***Ampex AG-500** 2HS tape recorder, good cond. Key Code 5-27.*

***Ampex PR-10** mono transport and electronics, fair cond, $200. Key Code 5-30.*

***Presto 800**, rack mount, 7½-15 ips, mono, FT needs work, as is $350. Key Code 5-54.*

***Scully 284-8**, 8 tk. Tape machine, full click suppression/sync master/Scully custom cabinet, 7.5-15 ips, w/8 tk. heads, $5600. W/out heads $4700. Key Code 5-63.*

***Tascam 701-4**, half inch 4 track recorder (works fine but sold as-is) includes home-built roll-cabinet if wanted, was $2000 new, complete with ALL manuals (bound) for $1200, excel. prod. machine. Key Code 5-74.*

***Ampex 351-1 stereo**, tube type, 7½-15 ips, original and perfect, $1500. Key Code 5-76.*

***UHER Teaching Machine**, Model 5500, New $350. Model 4000, complete $90. Key Code 5-80.*

***Ampex 602-2**. $720. Key Code 5-87.*

***Magnecord PT6** Decks $35, Electronics $35, both $50, clean, low mileage, need some work or excellent for parts. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Crown SX-824** Stereo/Quad (Special), 10½ in. reels, 3.75-7.5, with extra Crown stereo preamp, presently set up for: 2ch, 4T pbk & record (FT erase); 4ch, 4T pbk; 2ch, 2T pbk; and can be set up for Delay mode (for telephone talk shows, etc). In portable case (can be rack mounted). Excel cond. $1495. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Ampex 300-1** full track with electronics for stereo; new ½ trk play head, $350. Key Code 5-49.*

***Head stack for Scully 380**, 3 heads, two-track stereo, exc. $250. Key Code 5-54.*

***Magnecord 1024** quarter track ERP Rack Mount $400, Excel. Key Code 5-76.*

***Scully 284**, 8 track recorder. Key Code 5-81.*

***Ampex 601**, FT mono, excel. cond. $275. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Ampex 351-2**, 300 top plate, 7½-15, fair cond, $600. Key Code 5-61.*

***Sony 777-4** portable professional 3¾-7½ ips machines excel. cond. $250 each. Key Code 5-82.*

***Scully 280**, 4 Track, mod. 502-400-400 (No motion sense or servo motor) has sync-sync master. $2900. Key Code 5-95.*

***Roberts 192 HT**, mono. excel. cond. $125. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Magnecord Model 1021** R-R recorders (four), gd. cond. Key Code 5-21.*

***Ampex 602** mono tape recorder, fair cond. Key Code 5-27.*

***Revox A-77**, exc. cond. in walnut case, 7½-3¾ ips, 2-track stereo, $850. Key Code 5-54.*

***Ampex 300-2** 7½-15, P.B. Only, runs o.k, $500. Key Code 5-61.*

3M prof. recording deck 150 mil tape, convertible to any size tape. $900. Key Code 4-33.

Roberts 1770 D, 4 track, Key Code 4-40.

TEAC A-3340S 4-track, simul-Sync, 15-7½ ips, 10" reels, mint condition, $895, or best offer. Key Code 4-46.

Ampex 350 recorder, (quantity 2) rack mt w/preamps, 7½-15 ips, Key Code 4-63.

ITC 850 reel to reels, (quantity-6), 6 months old. $3,400 each. Record-playback, ½ track stereo. 7½-15 ips. 855-0005 model. Key Code 4-71.

Transports, 350, (quantity 2). Key Code 4-74.

3M Contata tape player, background music, one 26 hr. tape, works. $100. Key Code 4-80.

Maggie PT6 Rack mount (2 each), operational when removed from service. Best offer. Key Code 4-82.

Ampex 351 console cabinet, regular black slant face, good condition, $200. Key Code 4-81.

Tascam 70H2, 2 track stereo 7½ & 15 ips Master recorder, set up for Scotch 250, excel. cond., new heads. $1,100. Key Code 4-10.

Ampex 300 3 track & 4 track playback only. In console cabinet, $900. Key Code 4-33.

Ampex 601-2 Recorder, Rack mount w/preamps, 7½-15 ips. Key Code 4-63.

Lang playback electronics, no P.S., (quantity-4). Key Code 4-74.

Ampex 351, very clean low mileage, also spare Capstan motor 3¾ to 7½, or 7½ to 15 ips. All for $750. Key Code 4-79.

Berlant 10½ mono broadcast recorder, 3 motors run, heads worn, separate 4 mike mixer, lot $100. Key Code 4-80.

Scully 250-2 track, rack mount. Showroom machine. Warranty. $1900. 7½-15 ips, half track. Key Code 4-85.

Ampex Master Recorder, 8 Track, 350 series in operation with remote switches. $5000. Key Code 4-3.

Magnecord (PT6 type) 3 transports, 1 electronics & 1 ex-transport for parts. $200. Two like new. Key Code 4-32.

Ampex 351 ½ track mono, 7½-15 ips. Electronics fine, some problems with transport. Key Code 4-42.

Magnecord 10-22. Key Code 4-74.

Scully 2808-2 track, rack mount. Excellent cond. Showroom machine. $3000, firm. Key Code 4-85.

Ampex Master Recorder, 4 Track, 350 series in operation. $2,200. Key Code 4-3.

Scully 280-8 8 track reel to reel recorder, 1" tape, in console, With remote syncmaster panel. Good condition. Need to sell. Key Code 4-52.

Teac 91 Recorder 10" cap, 7½-15 ips made f/Concertone and Teac AR-12 Preamp. Key Code 4-63.

Ampex 601, full track mono recorder in portable case, excellent condition, $350. Key Code 4-64.

Ampex AG600-2 without case with complete factory manual. $400. Key Code 4-11.

Ampex 351 Master electronics. Very clean, were working when removed from service. 3 available. $150 each or all 3 for $400. Key Code 4-24.

TEAC A7030 solid state 10½ inch reel, 7½-15 ips, 2 track & ¼ track play. Like new. $600. Key Code 4-33.

Roberts 720A, 4 track. Key Code 4-40.

Ampex 600 reconditioned & upgraded to 601. In rack mount adapter. $450. Key Code 4-44.

ITC Model 750 in console, good cond, $1250. Key Code 4-52.

Roberts 1700 Recorder (quantity-2) 7" cap, 7½-15 ips, full track. Key Code 4-63.

Ampex 602-2, 2 track stereo recorder in wooden case, very good condition, $375. Key Code 4-64.

Sony TC-640B ¼ track stereo deck in showroom condition, solenoid control, $200. Key Code 4-64.

Revox A77 Portable ½ tr. with Dolby 7½ & 3¾, like new. $800. Key Code 4-75.

TEAC recorders. Demo units. 20% off A2300SX, 3300SX & SR. Warranty. Key Code 4-85.

Ampex AG-440-8 8 track with Servo-motor. Meets original specs. Excellent condition. SN404056. $6500. Key Code 3-8.

Otari Reel to Reel full track, 2, 4 and 8 track and highspeed duplicators. MX-5050B in stock. Authorized service. Also demos and used recorders. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel 608-257-7722 or TWX 910-286-2745.

Magnecord PT-63AH full track, portable transit case. Operates, but needs work. $75 as-is. Key Code 3-12.

Ampex 300 Deck. 8 track 1", Op-Amp Labs Custom Electronics. New heads. Asking $3500. Key Code 3-15.

The Exchange

CASSETTE...WTS...CONTD.

Crown SX-822 stereo recorders. 3 years old, used very little. In good condition. Two available at $800 each. Key Code 3-27.

Ampex 351 tube electronics. Key Code 3-31.

Slow Speed Loggers, Dictograph 15/16. Two available with one set of electronics. $250 for all as removed from service. Key Code 3-42.

Electrophonic TD-50, 8-track player and recorder. Portable Panasonic 8 track, case too. $65 for all. Key Code 3-61.

Ampex 602-2, 7½ IPS, excellent condition. $550. Key Code 3-96.

Crown SS-822 2-track, with Sel-sync and multiple-track select. 3-speeds. Excellent condition. $1400. Key Code 3-12.

UHER 1000 report pilot, $275. Key Code 3-32.

Ampex 300. Worn but useable.. 2 track, no electronics. $500 as is. Key Code 3-42.

Ampex AG-440B console, 2 and 4 track heads, remote control, every available accessory, superb condition. Key Code 3-75.

Ampex 601 recorder with leather case. Great condition. $200. Key Code 3-31.

Revox A77, 2-track, 7½-15, remote control, varispeed, rackmount. Key Code 3-75.

Technics RS 1500, RS 1520, RS M85, etc. Reel-to-reel and cassette, portable and rackmount. High performance pro gear, $200-2300. Also demo and used recorders. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel. 608-257-7722 or TWX 910-286-2745.

Monitor/Viking audio tape players-decks only. 7½ ips, ½ track stereo heads. 10 available as is. Best offer plus shipping. Key Code 3-5.

Ampex ATR-700 2 track stereo. 7.5 and 15 ips. Key Code 3-11.

Ampex 300 mono-old style electronics. As is, $900. Key Code 3-15.

Ampex 600. Worn but useable. In case but no cover. $100 as is. Key Code 3-42.

Otari ARS-1000, 2-track, stereo playback decks, for automation use. One and one-half years old, very good condition. Four available at $800 each, or all four for $3000. Key Code 3-63.

Wollensak tape recorders, 4 each. Key Code 3-67.

Ampex AG-500, slave electronics. Good condition. $400. Key Code 3-69.

WANT TO BUY

***Recorder 2-track**, late model. Key code 5-81.*

***Otari 1-inch**, 8-track with return to zero memory. Key Code 5-39.*

***Conversion equipment to rack-mount two Revox A-77's**, presently in walnut cases. Will swap cases for conversion or buy outright. Key Code 5-72.*

***Tascam 4-channel** electronics Model 702, for Series 70 recorder. Also Tascam 8-track head stack. Key Code 5-39.*

***Rack mounts for Ampex 601** recorders. Key Code 5-11.*

***Ampex 601**, gd. or easy to repair cond., even if it doesn't work. Price negotiable, but be reasonable. Key Code 5-58.*

***Reel-to-Reel**, 2 TR stereo, inexpensive. Key Code 5-43.*

***Cassette Duplicating machine**. Key Code 5-45.*

Revox A77, half track stereo, 7½-15 ips. Late models only in excellent cond. Key Code 4-57.

New or slightly used full and half track recorders. Key Code 4-65.

Magnecord 728, Electronics & power supply. Also looking for 2 track rec. & Play heads and VU meters. Key Code 4-21.

Ampex tape decks wanted for parts. Key Code 4-28.

Garner or Magnefax reel to reel duplicators, half track stereo, good or better condition. Key Code 4-57.

Slow speed logger in good working condition. Multi track if possible. Key Code 4-81.

Magnecord 728/1028, for parts, working or not. Key Code 4-21.

Ampex 350, 351 or solid state amplifiers. Old style head for Ampex 200. Ampex 400 good cond. Key Code 4-33.

8, 16, 24 multitrack decks needed. New or slightly used equip. only. Key Code 4-65.

8ell RT-360 recorder/duplicator. Key Code 3-29.

Reel-to-Reel playback decks. 2 each. Suitable for automation system. Key Code 3-43.

Record Playback Recorder, broadcast quality, need 2. Minority College Radio Station will accept donations. Key Code 3-86.

Control Room Equipment, must be in good condition for immediate on-air usage. Key Code 3-82.

TEAC 3340-A in good condition. Reasonable. Key Code 3-31.

Scully 280 2 tracks transport and electronics. Working condition. Key Code 3-93.

Reel-to-reel Decks, 7 inch operates on 12 volts DC with or without rec-play electronics. Key Code 2-12.

Sony 850 tape decks. Key Code 2-12.

Ampex 300 and 3200 tape decks. Key Code 2-12.

Sony 850-2 or 850-4. Ten and one-half inch reel tape deck. Key Code 2-23.

CATV-MATV EQUIP.

WANT TO SELL

***Studio end PBR-30** AR with Data Receiver. Key Code 5-94.*

***Ampex headbox with 2 PB headcables**. Key Code 5-94.*

***Ampex ABR parts**. Send for list. Key Code 5-94.*

Dynair solid state CH 2 CATV modulator. FB cond. with book. $400 or offer. Key Code 4-72.

B.T. MLA-C, VHF broadband amplifier. Masterline, channel amplifier, five units available in working condition. Best offer plus shipping. Key Code 3-5.

B.T. MCS-FM, VHF broadband amplifier. Masterline, channel amplifier, two units available in working condition. Best offer plus shipping. Key Code 3-5.

Dynair TX 1B modulators. Key Code 3-48.

Output Channel Amplifier, FM Hi output with AGC Jerrold Model HPM. Two units available in working condition. Best offer plus shipping. Key Code 3-5.

Jerrold $2300 VHF broadband amplifier. Four units available in working condition. Best offer plus shipping. Key Code 3-5.

WANT TO BUY

***HBO converter needed for 2.1 GHz**, top price paid. Key Code 5-53.*

***Need MDS down-converter**, preferably with subscriber antenna; cost is unimportant for functioning unit. Key Code 5-53.*

CATV Equipment needed for new franchised cable system. Construction head end and line equipment required. Key Code 3-74.

Parabolic Dish, 10 feet or larger. Any condition. Key Code 3-10.

Triple Crown TSP Processors, Blonder-Tongue AVMT and AMT modulators. Any Channel. Key Code 3-46.

CONSOLES

WANT TO SELL

***Sony MX-20** 8 x 4 Mixer, like new w/tape monitor switch added balanced in/out, $500. Key Code 5-74.*

***Electrodyne Console**, 20 in/6 out excel. cond. Stereo echo. Patch bay, many extras. $8000. Key Code 5-93.*

***Custom Heil 12 x 4** Mixing Console w/Duncan Faders. Used. Key Code 5-88.*

***CM-607** (CM Laboratories) Disco Mixer. New. Key Code 5-88.*

***Tangent Mixing Console 12 x 2 x 1**. New. Key Code 5-88.*

***Russco mixer**, Studio Master 505, mono with Canon XLR connectors. $500. Key Code 5-10.*

***MM Electronics 16 x 2 x 1** Mixing Console. New. Key Code 5-88.*

***Budweiser console**; Input section: 20 inputs; Monitor section (solid state): 24 in and 2 out. The console uses discrete solid state components throughout with the exception of the tube input modules. $18000. Call or write for complete details. Key Code 5-95.*

***Gates prbducer board**. Four pots, 12 inputs, vu meter, mono, good cond. Key Code 5-27.*

***Tascam Model 10**, used under 10 hours. Quad pan, input cue/solo, monitor mixdown plus more 8 in, 4 out. Key Code 5-52.*

***Fairchild 16 in, 4 out**, plus Q-mixing console with equalizers, tone generator and all transformers, in and out, reconditioned. Key Code 5-73.*

***Spotmaster Consoles**. New. Send for literature. Best package prices on trade-in of surplus equipment. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Gates 4 channel**, solid state Producer Console, mono, rough but works, best offer. Key Code 5-9.*

***Collins 212F-2**, 6 mixer, 17 input mono console. Includes manuals, spare Pgm amp, built-in limiter. Price negotiable. Key Code 5-24.*

***Biamp #1282 Mixer**, new. Key Code 5-88.*

***Gates Dynamote** Portable remote mic mixer amp, good cond, $70. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Wilkinson TSC-4**, 7 mixer stereo board. Key Code 5-51.*

For the latest in consoles from **Midwest Bdct Supply** see their ad on Page-5.

Collins 6 channel model 212-S stereo console. 24 inputs, $900. Key Code 4-25.

Russco 5 channel mono Mixer. Like new, 90 day warranty. $450. Phone, mic & line inputs. Key Code 4-85.

Sony MS-16 Mike Mixer, excellent cond. $450. Key Code 4-25.

Bogen PA Mixer, model LOM Series E-97, brand new. Key Code 4-40.

GE BC-11-A console, 9 pot/dual out w/12 preamps & power supply, requires some work. Key Code 4-63.

Bogen MXM-5 input mixer with input & output transformers, good condition, $100. Key Code 4-64.

Bogen MTM Preamp/mixer, 4 lo-Z Mike/2 Hi-Z inputs, new. Key Code 4-63.

Altec 1567 (2 each) $150 & $200 w/case, Cannons, xfmrs. Key Code 4-80.

Gates CS-52 Studioette, fair cond. Best offer, includes manual; ideal production tool. Key Code 4-35.

MCI 428 professional console 28 x 24, light meters, excellent condition, $25,000. Key Code 4-56.

Sony MX-14 6 in, 2 out with mike, line & phono on each, excellent condition, $125. Key Code 4-64.

Stevenson Interface Board 9 in/4 out with compression module. $2,800. Key Code 4-3.

Gates Yard, 8 channel, (Mono 20 inputs) Manual. Best Offer. Key Code 4-82.

Spectra Sonics 24 track console, good cond., $14,000 or best offer. Key Code 4-84.

Bogan Sound Systems JOL mixer. Four mic., one phone input, output, Hi-Z or Low Z. Best offer plus shipping. Key Code 3-5.

Gately EM-7 four channel mike and line stereo mixer. Includes echo facilities and EQ-7 equalizers. $100 complete with power supply and instruction manuals. Key Code 3-7.

Langevin. 7 mikes, 2 turntables, 2 remotes, stereo output, with power supply. 8-AM-16 pre-amps, 2 AM-17 amps. Asking $1100. Key Code 3-15.

McMartin B-502 5 channel stereo. Excellent condition. All offers considered. Key Code 3-78.

LP8 S-20, 10 mixer dual stereo console, 30 inputs. All transformer inputs and outputs, very versatile and in good working condition. Key Code 3-79.

Consoles Custom-built. One with 12 in and 4 out, the other 16 in and 4 out. The 12 is complete and the 16 is not quite. Inquire for information. Key Code 2-49.

Viscount video systems. 4 microphones, 4 line bal in, 4 output. Program and cue 600 ohms, program and cue mon 2W at 8 ohms. $125. Key Code 2-45.

WANT TO BUY

***Console 4 or 5 pot stereo**, inexpensive. Key Code 5-43.*

RCA BC-7a, BC-8, and BC-10 Consoles. Must be in good shape. Key Code 4-2.

Electrovoice Eliminator 2: Loudspeaker system. Key Code 4-10.

Sparta 4 or 5 channel mixer. Key Code 4-16.

Gates M-4880 Dynamote 4-channel remote amp—complete, but not working, for the parts. Key Code 4-19.

Pre-1950 RCA Western Electric, Collins, Langevin, etc. also related equipment. Key Code 4-33.

TEAC Model 5 expander. Key Code 4-88.

Tascam Model 10 Input Modules #101. Key Code 4-5.

Manual for old tube type Gates Studioette console. Key Code 4-49.

Recording and broadcast consoles needed immediately. Key Code 4-65.

Tascam 16 Monitor Mix Module. Key Code 4-5.

Mono console: tube or solid state. Key Code 4-41.

Collins 212-E in any condition also RCA BC-6 in any cond. Key Code 4-79.

Mike Mixer Console, small, older tube-type, Key Code 3-67.

Control Room and Production Room Consoles for Minority College Radio Station, will accept donations. Key Code 3-86.

Solid State Stereo Audio Console, 8-10 channel. Key Code 3-81.

Solid State Stereo Audio Console, 5 channel. Key Code 3-81.

Stereo Mixer, 5 or 8 channel. Key Code 3-92.

DISCO & SOUND EQUIP.

WANT TO SELL

***Biamp EQ 210-Stereo** graphic 10 Band. New. Key Code 5-88.*

***Matrix PPI-16** Electronics. New. Key Code 5-88.*

***SP-108** (Concertaudio) Floor Monitor. New. (6). Key Code 5-88.*

***Marantz 10B** Stereo Tuner, collectors item, excel. cond, $650. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Klipsch Model B Corner Horns** (pair), cost $2500 new, excel. cond. $1695. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Fisher Series 80** AM Tuner, good cond, $59. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Pace 1/3rd** octave Pro SR-271 Graphic EQ's. New. (five). Key Code 5-88.*

***Snakes**, 9 Pair x 100ft. New. (two). 15 pair x 100ft, 17 pair x 100ft, 19 pair x 100ft, and 27 pair x 100ft. Key Code 5-88.*

***Mic cables**. New 25, 50, and 100 foot in quantity. Key Code 5-88.*

***Electro-Voice EVX-44**, 4 chan matrix decoder, excel. cond, $69. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Small Community horns** w/Altec 808-8A & 80 Drivers (used) (three). Key Code 5-88.*

***Ashly SC-66** Parametric Stereo EQ. Used. Key Code 5-88.*

***Mastering Room package**, includes: Scully Lathe #501, Scully 280-mastering tape recorder, plus many other top brand items. $25000. Call or write for complete list. Key Code 5-95.*

The Exchange

DISC...WTS...CONTD.

***Marantz 7T Stereo Console**, good cond, $249. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***DBX units**, Model 122, $225. Model 124, $325 (2 avail.) or all 3 for $800. Key Code 5-49.*

***De Coursey Stereo Electronic Crossover-800HZ**. New. Key Code 5-88.*

***Bose Model 2201 Corner Horns (4 ea) with built-in 50W. amps. Walnut and hand carved Indian Sheeshamwood cabinets, hand loomed Tussah raw silk grille cloths. Cost $3944 new. Like new, $2995. Send for brochure. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

ElectroVoice Interface: B speaker system. In factory carton. $675/pair reduced to $550. Owner will ship anywhere in U.S. Key Code 4-85.

DBX 124, 4 channel noise reduction system, Mint condition $319 or best offer. Key Code 4-46.

Ampex, entire 8 & 4 track studio, with complete wiring with mikes and speakers. $14,000. Key Code 4-3.

Bogen M303 PA amplifier, 3 mic channels one line channel tape out jack new cond. $50. Key Code 4-49.

Altec 604 speaker, new woofer cone, $150. Key Code 4-79.

Stromberg-Carlson RP-44, 4 trump speaker. Includes drivers, and 600 feet speaker wire with connectors. Working condition. Best offer plus shipping. Key Code 3-5.

Mellotron 400. Brand new motor, Servo board and new rack of violin, cello, flute tapes. $1500. Key Code 3-8.

Sound Craftsman 20-12 10 band stereo equalizers. Excellent condition. $225. Key Code 3-8.

Peavey PA-700S stereo-mixer, amp and equalizer. Like new, with cables. One pair of Sp-1s. Key Code 3-77.

Sony 500 decoder. SQD 2020. Sony encoder-mixer. SQE-2000. Key Code 2-48.

WANT TO BUY

EMT or AKG reverb or plate. Key Code 4-28.

ALTEC Drivers: for 203B horns. Key Code 4-10.

Pultec, Lang, API or any other active EQ. Key Code 4-28.

JBL LEB5/HL91, other JBL drivers considered. Key Code 4-61.

Any Digital delay or misc. effects gear. Key Code 4-28.

Disco Speakers, 100 to 150 watt range. In good condition, will accept any reasonable offer. Key Code 3-73.

EMT-140 plate, prefer stereo, with remote damper. Key Code 3-8.

HELP WANTED

Maintenance Engineer for broadcast facility to maintain all phases of video production equipment. Contact Robert Henderson, Windsor Total Video, 565 Fifth Ave, New York NY 10017. 212-725-8080.

LIGHTING EQUIP.

WANT TO SELL

Houston Feerless portable dolly-light in good order with friction head never used $50. Key Code 4-78.

WANT TO BUY

Portable stage lighting for group, need used gear in good cond. Key Code 4-10.

LIMITERS

WANT TO SELL

Roger Meyer, RM-58 stereo or dual mono limiter. $400. Key Code 5-78

Collins 26U-3 Auto-Limiting Amplifier, excel. cond, $395. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.

***Gates Dual Peak limiter**, M6144, good condition, with manual. Key Code 5-4.*

***Gates Sta-Level**, Model M-5167, exc. cond, $100, FOB. Key Code 5-59.*

***Wilkinson TAMM-1A** AM Modulation monitor with PPF-1A Positive Peak Flasher. Like new, $695. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***ETSS Audiomax III Mod 444**. Key Code 5-13.*

***Ashley solid state peak limiter compressor**, 1 yr. old, exc. cond, $200, FOB. Key Code 5-59.*

***RCA BA6A**, clean checked out, $50/each. Key Code 5-61.*

***Gates SA-38 and SA-39B** Limiting Amps, not checked out, look ok, $65 ea. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Spectrasonics Model 610 limiters**, (2), exc. cond, sell or trade for two (2) Urei 1176LN limiters. Key Code 5-41.*

***Gates Level Devil**, exc. Cond, $100-FOB. Key Code 5-59.*

***Urei 175-B**, clean, gd as new, $150. Key Code 5-61.*

***Gates Solid Statesman AGC**, good cond, $395. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Gates 'Solid Statesman' FM limiters**. Matched for stereo, excellent cond, pair for $850. Key Code 5-23.*

***CBS Volumax 4110** four years old, exc. cond. Key Code 5-27.*

Gates Limiter, fair cond., Model M-35298, $50, FOB. Key Code 5-59.

***CBS 710 Automatic Loudness Controller**, excel. cond, $535. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***CBS Audimax 4450A**, four years old, exc. cond. Key Code 5-27.*

***Kahn Symmetrapeak Model SP-58-1A**, exc. cond, $100, FOB. Key Code 5-59.*

CBS Volumax. $150. Key Code 4-1.

Gates Solid Statesman FM Limiters 994-6631-001. Quantity, two. In good condition. $150 each. Key Code 4-11.

CLE-500 Compressor-expander. $300. Key Code 4-1.

Spectra-sonics Complimiters 610. Quantity, two. $250 each. Key Code 4-11.

Mono Audimax 4440 $600. Stereo Audimax 4450, $900. Key Code 4-13.

Gates Radio Compression limiter model M-3529-B. Key Code 4-40.

Electrodyne Compressors, quantity 2, Model CA 700, excellent cond. $600 each. Key Code 4-44.

UREI BL-40 modulimiter. Demo unit. $591.50, warranty. Key Code 4-85.

Urei LA-3A Leveler Amplifier. Key Code 4-1.

LPB S-2 Audio Compressor/Limiter with variable compression threshold & limiter defeat. Key Code 4-7.

CCA Model LA-1D Limiting Amplifier (Tube Unit). Key Code 4-1.

Gates SA 39A limiting amp. Fair cond. Best offer includes manual. Key Code 4-35.

General Electric 4BA9 uni-level compressor amplifier. Fair condition. $75. Key Code 3-17.

Solid State CLE sound brighter. Both limiter-/compressor in stereo model. Like new. Key Code 3-18.

CBS Audimax. Key Code 3-31.

CBS 4450A stereo, AGC-great condition $950. Key Code 3-93.

Urei BL-40 Modulimiter, prefect operating condition. One year old, but used less than 6 months. $525 or best offer. Key Code 3-54.

Collins 26U-1 peak limiter, late model. Needs work. $75. Key Code 3-12.

FM Limiters. Hi-mod capabilities. Fast and with good overshoot space. Pair needed for college with tight budget. Key Code 3-1.

Collins 26U-3 limiting amp. Very good condition. 2 available at $100 each. Key Code 3-17.

Pultec Program Equalizer EPQ-1. Key Code 3-31.

Garron Phase Enhancer, in like-new condition. $600 or reasonable offer. Key Code 3-63.

Altec Lansing 1591A ompressor limiter amps. Like new. 2 available. $150 each. Key Code 3-8.

CBS FM Volumax 4111 stereo, excellent condition. $750. Key Code 3-55.

Gates Solid-Statesman AGC, $500. Key Code 3-12.

Volumax 400s, in excellent condition. Four available at $395 each, or reasonable offer. Key Code 3-63.

Gates Stay-Level SA-39B limiting amplifier. Fair, not working condition. Key Code 2-76.

WANT TO BUY

***CCA LA-1D** limiter compressor amplifier, good cond., used. Key Code 5-28.*

***Urie 1176-LN** limiters (2), trade for two (2) Spectrasonics Model 610 limiters. Both exc cond. Key Code 5-41.*

CBS 4100 limiter, must be in good cond. Key Code 4-34.

Spectrasonics Complimiter 610. Key Code 4-88.

CBS Audimax II AGC for Stereo. Two wanted. Must be in good shape. Key Code 4-2.

CBS 4110 limiters, must be in good cond. Key Code 4-34.

FM Limiter. Key Code 4-38.

DBX 162 Stereo compressor/limiters. Key Code 4-10.

Teletronix or Urei limiter compressor. Key Code 4-28.

MICROPHONES

WANT TO SELL

***Neumann U-67**, Sony C37A, ADG D-900 system, ADG D202 and many more used, demo, and new microphones for sale, mostly trades on our new equipment. Call or write for our used equipment list. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel: 608-257-7722 or TWX 910-286-2745.*

***Shure SM-7 mike** $200. Key Code 5-75.*

***Sony, Shure, Sennheiser, ElectroVoice, AKG, AudioTechnica and Clear-Com** condensor, dynamic microphones and intercom headsets. Parabolic, Lavalier and wireless in stock now. New demo, rebuilt and used. Also rentals. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel: 608-257-7722 or TWX 910-286-2745.*

***Marti microphones (2)**-MCD-70. 'Push-to-Talk' type. Require four prong jack, exc. cond., $50 ea. Key Code 5-23.*

***Sennheiser MD-421** Dynamic Studio Cardoid, excel. cond., $195 ea. (3 available.) Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Electro-Voice microphone**. 652-long neck style, good cond., $15. Key Code 5-23.*

RCA 44 (quantity 2) recently reribboned and reconditioned. One with original floor stand and one with original piano boom. Key Code 4-63.

Beyer M-320 Ribbon/Dynamic, NEW, w/cable, Cannon conn. beautiful sound. $50. Key Code 4-80.

Sennheiser MKH415T mini shotgun $400 or trade for Neumann. Key Code 4-28.

Electro-Voice 643, 7 foot long super "shotgun" as used on Presidential News Conferences, "like new", $800. Key Code 4-44.

Shure PE 588's, quanity (3), $40 each. Kay KCM-44 condenser, quantity (4) $20 each, $190 all 7 or best offer. Key Code 4-46.

Neumann tube microphones, various. Assorted AKG, Telefunken, Sennheiser & Neumann. Key Code 4-83.

Sony Paraboloid #PBR 400, NEW, makes a mike into a shotgun, $40. Key Code 4-80.

RCA Mike Booms, KS38, 3 each, large. Altec 639 microphones. Key Code 3-76.

RCA 44BX wanted in any condition. Have some mikes to swap. (W.E., RCA, ECT.) Key Code 3-40.

Broadcast Quality Mikes, need several. Minority College Radio Station will accept donations. Key Code 3-86.

WANT TO BUY

***Telefunken VF-14 tube**, for Neumann U47 microphone. Also, Telefunken AC701 or AC701K tubes, Neumann Power supplies and cables. Key Code 5-79.*

***Neumann U-67s microphones**. Key Code 5-81.*

***Neumann U-47**, U54, U64 and KM 84, also tubes for 47. Key Code 5-29.*

***RCA desk stand Model 91-D** (MI-4092G). Key Code 5-37.*

***Western Electric 639** A/B microphone. Key Code 5-37.*

***Telefunken (Neumann) U-47 or U-67**. Key Code 5-54.*

Neumann U47, U48, U67, M49, M50, KM-54, KM-56, AKG C-12, C-12A, C-24, and VF-14 tubes. Key Code 4-20.

PRE 1950 condensor, carbon, dynamic. RCA, Western Electric, ALTEC, Neumann, AKG, Universal, American. Key Code 4-33.

Neumann condensors, tubes or solid state models. Key Code 4-21.

Neumann microphones of all styles in any cond. Also extra parts, power supplies, literature, etc. Key Code 4-28.

Telefunken U47, U48, M251. Key Code 4-83.

Sony: ECM-377, ECM-280, ECM-33P, need several of each in good cond. Key Code 4-10.

RCA 77 or 44; EU 666 or 667; quality mics of all types. Key Code 4-28.

Electrovoice 643, long range microphone. Key Code 4-55.

Electrovoice RE-20, good condition. Key Code 4-57.

Neumann M49, 249, U47, U48, U67, M50, 269, KM 54, KM 56, 256 KM 66, SM-2 tube microphones, AKG C-12, C-12A, Telefunken 251 & VF-14 tubes for U47-48. Key Code 4-83.

Atlas BS36W and B536 Booms and Stands. Key Code 4-83.

RCA 77D or 77DX. Two needed in working condition, preferable with desk stands. Key Code 4-42.

Broadcast and recording mics needed immediately. New equipment only. Key Code 4-65.

RCA 77DX, 44 BX, BK 5, 10001-KU3A Ribbon microphones. Beyer M 88. Key Code 4-83.

Schematics for any Neumann Mics or power supplies. Key Code 4-28.

Shure 55 Old-Fat Type, swap newer thin 55S or $? Key Code 4-79.

Beyer M-500, Shure SM57, Senheiser 421. Key Code 4-88.

Sennheiser MD-421, EV, RE 15, RE-20, RE 35, AKG-451E and D119E. Key Code 3-15.

RCA-44BX, velocity, and RCA-77A or D on desk stand. Key Code 2-5.

MISCELLANEOUS

WANT TO SELL

***Apeco copier**, single sheet type $500. Key Code 5-87*

***Warehouse Cleanout**. Ashland A84HCEZU-8A 600/1200 rpm sync & G.E 5KCP12BG22 4 pole motors. All new, never used. Best offer. Key Code 5-5.*

***Dual rack cabinet**. Two standard 19" racks side-by-side, blue armorhide, removable formica desk top at front. Two adj. sets of rack channels. Side and rear doors. Three sets chassis slides, a-c box mounted. Size less desk 48½ x 26 x 75 inches high on heavy duty casters. New, some shopwear. $200/each. You pay shipping. Key Code 5-44*

***Capitol switch assemblys**, 21 switchs, DPDT on 3½ panel. Key Code 5-94.*

***UTC PC-08 Transformers**, 60 each (Similar to Ouncer series) 600 ohm to 15 Kohm. $3.50 each. Key Code 5-94.*

Texas Electronics 'Mark IV' weather station, complete, requires some service, $75. Key Code 5-23.

The Exchange

MISC....WTS...CONTD.

Uninterruptible power system. *Charger-Inverter provides 115VAC at 300 VA up to 24 hrs, from 24 volt battery (not supplied) if power fails. Battery voltage and current meters, max. output 5 amps, new, with manual. $100/each. You pay shipping. Key Code 5-44.*

Multiple output power supply. *Input 115 VAC, outputs (plus/minus) 50 VDC at 500 ma, -24 VDC at 1 amp, -18 VDC at 2 amps, -12 VDC reg at 3 amps, (plus/minus) 9 VDC at 300 ma, +6 VDC at 600 ma (adjustable to 5 volts). Outputs individually rectified, filtered, fused, common ground. With selectable output voltage meter, New. $100/each. You pay shipping. Key Code 5-44.*

MICA Transmitting and phasor capacitors. Many different ratings and values. Call with your requirements. Key Code 4-24.

Ampex 440 cabinet. Key Code 4-74.

Altec, VU meters, large type used in 250-230 console fits Gates & RCA as well. $30. each. Key Code 4-79.

Bay 6' Rack Emcor, Quantity 2, door on 1 side, $100. You pay freight & crating. Key Code 4-4.

Angle iron sample loops. Type 'N' output. With mounting hardware and insulators. Heavily galvanized, and in excellent condition. 4 available. $50 each. Key Code 4-24.

Pyrex bowl feedthrough, 7 inch. Several available. With stud, $8, without, $5. Key Code 4-24.

60 double patchpoint jackfield wired to barrier strips. $50. Key Code 4-24.

Pyrex bowl feedthrough, 6 inch. Several available, with stud $5, without, $3. Key Code 4-24.

Daven 250, pots for old RCA-Gates—G.E. boards. $10 each. Key Code 4-79.

Jennings Vacuum Variable's UCSLPA 750. $50. each. Key Code 4-4.

Phasor and LTU RF Coils by E.F. Johnson several types available. ribbon and ceramic core. Fixed and variable. Call for details. Priced $10 to $50. Key Code 4-24.

Plate Transformer & mod. reactor for BC 1, new. Key Code 4-32.

Gates radio switch & fuse panel, model 994-4242-001. Key Code 4-40.

UTC Effects filter, good condition, $35. Key Code 4-49.

Phasemaster 7000 single-phase to 3-phase converter, 100 amp output. $3,298.40. Key Code 4-70.

Circuit board & panel meter for Gates M-4990 AM freq. monitor. $12 for both trade for something of equal value. Key Code 4-19.

Capacitors: nitrogen pressurized phasor capacitors by E.J. Johnson. Some fixed, some variable. Call with your requirements. Key Code 4-24.

Moseley RFK-1 sample units. New and as-new condition. 5 available. $25 each, or all 5 for $100. Key Code 4-24.

Gates Radio switch & fuse panel model MO-3005. Key Code 4-40.

McCurdy Roll-around cabinets, (quantity 3), for reel to reel machines. Key Code 4-74.

Equipment Rack. 6'9" at $50. Key Code 3-15.

Bantam Jack Panels, 96 T-R-S jackson 1¾" x 19" panel. 2 N.C. contacts. All new. $95 each. Key Code 3-96.

Sangamo G-5 9.1 amp, .00015 MFD. 2 available. New condition. Will sell or trade. Key Code 3-13.

Monitor Controller RF contractors. 15 KV 35 A. Spare parts available. Key Code 3-20.

Vantage II microform reader, $100. Key Code 3-52.

Ampex Video Tape Spooler for ACR-25 carts. Type 1370650-01. Make an offer. Broadcast Export Association. 800-336-3045.

Mike Cable, 125 feet. 2 conductor with shielded coax. $10. Key Code 2-19.

Cable Stripper, excellend condition, like new. Key Code 2-76.

Teletype Corp 3320 printer with 5JE punch reader and Carterphone DX 1030A-7 with DelData dialer. Key Code 2-2.

WANT TO BUY

Equipment racks, price negotiable. Key Code 5-58.

Dummy load for 10KW AM, *must be in gd. cond. and reasonable. Key Code 5-60.*

Studio Warning ("On the Air") Lights/fixtures made prior to 1960. Key Code 4-6.

Broadcast Transcription by big bands "Here's to Vets" etc. Will pay freight. Key Code 3-80.

Patch Cords and Patch Audio Panels for 19 inch rack. Key Code 3-47.

16mm Sound Films, color-black and white fair-to-good condition. Extra prints and/or discards accepted. Anything you can spare. Key Code 3-51.

Country and Gospel Records, wanted for radio programs. Send quanity, condition and price by letter. Key Code 3-82.

EBS System 2 tone. Key Code 3-94.

MONITORS

WANT TO SELL

Belar SCA monitor, *good cond. Key Code 5-27.*

RCA 1181 *frequency monitor. Key Code 5-36.*

RCA 66A *modulation monitor. Key Code 5-36.*

Nems Clarke 108E, *3 tower phase monitor, good cond, $95. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

HP 335 FM *modulation monitor (3). Key Code 5-36.*

Andrew 40-C *Phase Monitor, $95. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

Andrews AM phase 40C monitor. *Key Code 5-36.*

General Radio Frequency Monitor Model 1181-A, *1430 KHZ. Good condition, best offer. Key Code 5-77.*

TFT 713 AM Frequency and modulation monitor. Like new cond. Calibrated by TFT in summer of 1977. Will have TFT tune and test on your frequency as part of purchase price. $1250. Key Code 4-24.

Gates M-4990 frequency monitor, near new condition. Make offer. Key Code 4-27.

Gates 2890 freq. monitor, needs some work. Best offer includes manual. Key Code 4-35.

Johnson Air FM & SCA Tuner (tuned for 97.7 Mhz) Model 1C-1. Key Code 4-40.

Gates M4990 AM Freq, tuned to 710kc. New condition $50. Non-commercial, needs money. Key Code 4-49.

Nems-Clarke Phase Monitor, Type 108E for 3 towers. $200. Key Code 4-60.

Gates 2369 mod-monitor. fair cond. Best offer includes manual. Key Code 4-35.

Potomac Instruments, RMP-19, remote meter panel. $160. Key Code 4-60.

Gates Radio Modulation Monitor Model M-2639. Key Code 4-40.

Miratel Air Alert model AA1. Key Code 4-40

Gates SCA Monitor GTA 6741. $50. Key Code 4-11.

Gates Radio Frquency Monitor model M4990 tuned to 1350 KHz. Key Code 4-40.

General Radio 1181-B Freq. Mon. AM $55. Key Code 4-60.

Gates Radio Frequency Monitor Model MO-2890, tuned to 1420 Khz. Key Code 4-40.

General Radio 1931 B., AM Mod. Mon. $100. Key Code 4-60.

McMartin TBM-2000 SCA monitor modulation & injection. $100. Key Code 4-80.

H-P 335E TV frequency and modulation monitors for channel 73. Like new. 2 available at $500 each. Key Code 3-49.

Gates GTM 88F frequency monitor. Key Code 3-65.

General Radio 1181A, SN 636 frequency monitor. On 1600 KHz, with some spare tubes. $50. Key Code 2-1.

RCA BW-95A SCA frequency and modulation monitor. Excellent condition. $725. Key Code

WANT TO BUY

Metron 506B-1 *A.M. modulation monitor, good cond., used. Key Code 5-28.*

RCA BW-43 AM *modulation monitor, good cond., used. Key Code 5-28.*

F.M. Modulation monitor. Key Code 4-38.

FM—RF Amplifier to drive FCC approved modulation monitor. Key Code 4-67.

Modulation Monitor, FM stereo. Key Code 3-81.

AM Modulation Monitor with RF amp, in good condition. Send picuture and information. Key Code 3-94.

Belar FM-S1 stereo monitor. Key Code 3-91.

MOVIE PRODUCTION EQUIP.

WANT TO SELL

Camera Motion Picture 35MM *Arriflex Model A-mint condition factory overhauled matt box, var speed motor 2 mags. $500. Key Code 3-37.*

Auricon Pro-600, *exc, complete in case, 2 mags, no amp or mag heads. Angineux 12-120 zoom, tripod & dolly. Package $1600. Key Code 5-54.*

Bell & Howell 200EE 16mm movie w/case. Fair-to-good cond. Sold 'as is'. $17.50. Key Code 4-19.

Arriflex 35mm Key Code 4-78.

Auricon Pro 600 with separate film recorder. Key Code 4-78.

Moviola Edit Mac. 16mm picture only. Like new $275. Var. Sennheiser mocrophones. Key Code 4-33.

Auricon Pro 1200 complete with cases and mag head never used. Key Code 4-78.

Magna-Tech Model 31 compressors, good cond. $200 each. Key Code 4-44.

Bell & Howell 240EE 16mm movie camera w/case and extra reel & 4 rools K-25, B-W film. $205. Key Code 4-19.

Eastman Kodak K110 16mm camera with turret. 25mm F1.9, 15mm F2 and 63mm Kodak Ektar Lenses. Excellent condition $350. Key code 4-8.

Camera Pro 600 16mm, complete outfit with cases and film recorder for unit. Key Code 3-37.

Camera, Movie 8mm Bell & Howell, will electric eye, zoom animation feature, and normal speeds. Case, 2 cassettes film load-and Technicolor 8mm continous projector. Best offer. Key code 3-90.

H.F. Portable Dolly, like new condition. H.F. Head. $495. Key Code 3-37.

Houston Fearless Camera Dolly, portable and in excellent condition. Best offer. Key Code 3-90.

Spindler and Sauppe Selectroslide Jr, with 7-inch f-4.9. Single drum 35mm slide projector in working condition. Best offer plus shipping. Key Code 3-5.

Minolta D-10 Super-8 Camera with Wilcam mag. sound coversion, mike, amplifier, magazine, chest pod. $800. Key Code 3-49.

WANT TO BUY

Projector, 16mm., may need work, Okay. Key Code 4-4.

Neumade-Griswold model R-3 splicer for 16mm film. Well-used needed, complete in good cond. Key Code 4-19.

Neumade Showmaster film timer-footage counter combo. Single hub, left-to-right teeth in back. Well-used, but good cond. Key Code 4-19.

Schneider Zoom camera lens with C-mount. Key Code 4-78.

POSITIONS WANTED

"No listings this month"

RECEIVERS & TRANSCEIVERS

WANT TO SELL

Johnson Z42-540 *remote transceiver, four years old, good cond. Key Code 5-27.*

Dymek AM-5 *long dist. AM receiver, DA-5 antenna. Practically new; cost $580 will sell $365. Key Code 5-16.*

Motorola HT-220, *4-channel VHF Handle-Talkie, 5 watt, with charger, remote mike and touch-tone signalling, $400. Key Code 5-53.*

Moto, GE, KAAR Aerotron, etc. Some Tube, some transistor send for list. Key Code 4-4.

National NC175, a battleship, all new tubes align. $50. Key Code 4-32.

Health AR 3 looks like factory wired, works okay. $25. Key Code 4-32.

SCA Tuner with 92.7 xtal not working, no info. $20. Key Code 4-32.

McMartin SCA Receivers... tube type, 6 each TN 66CB, 7 each TN 77CB, 5 each TN 88B. All were working when removed from service, tune to 101 Mhz. $1000 plus shipping takes all. Key Code 4-36.

Motorola 2-way UHF Tube Type. In the way, make offer. Key Code 4-36.

Realistic 30-50 MC, look unused. $35. Key Code 4-32.

Marti old type receiver 161.7, 162.4 xtals complete but bad looking $25. Good for hams. Key Code 4-32.

WANT TO BUY

NOAA *weather receiver with alert circuit; 162.475 MHz. Key Code 5-49.*

ITFS Receiving System or Down Converters, 2500 to 2690 MHZ Range, Plus Dishes. Key Code 4-4.

Cushman, IFR or Singer two way radio/monitor. Key Code 3-95.

Heathkit tube-type high-fidelity AM tuner. Key Code 2-44.

REMOTE & MICROWAVE EQUIP.

WANT TO SELL

CCA RPT 150-40W *remote transmitter, four years old, good cond. Key Code 5-27.*

RCA Model BN-6 *transistorized remote amplifier, $95. Key Code 5-26.*

CCA RPR-540 *remote receiver, four years old, good cond. Key Code 5-27.*

Marti 960 MHZ STL *without antennas. Best offer. Key Code 5-89.*

Microwave Assoc. 2 GHz, STL, MA-28 *with built in 7.5 & 8.5 MHz sub-carriers, A-1 condition. Key Code 5-66.*

Rust 108 remote control system. 1 transmitter unit; 3 tower interface; 2 studio units and duplexer for 2 control points. $600. Key Code 4-60.

Gates Radio Remote Control Unit, studio unit model M5864, transmitter unit model M5663. Key Code 4-40.

Rust ALR-100 Autolog Studio Unit. $200 as is. Key Code 4-81.

Moseley remote control studio, transmission, telemetry units, worked fine when removed from Service. Make offer. Key Code 4-27.

Transmitters and Receivers, 7GHz microwave, 100 mw. Rackmount. 2 each. Will sell or trade. Key Code 3-13.

Microwave Associates power supplies for MA2, 4, 7 13 series (15 spares) TX and RX, 24V and 115V, $100-200 each. Key Code 3-66.

Rust, remote control. Key Code 3-87.

Microwave 7GHZ, wave guide fittings. Will sell or trade. Key Code 3-13.

Dish and Horn Feed, 6 feet diameter plus base mounting. $100. Key Code 3-10.

Rust 10 channel remote control/telemetry. Key Code 3-14.

Moseley TMR-1 telemetry receiver. Subaudible metering recovery circuit. 67 KHz in good condition. $75. Key Code 2-3.

WANT TO BUY

STL, stereo, with or w/out remote control. Key Code 5-49.

Moseley PCL-303C *or PCL-505C composite STL, 947 MHz. Key Code 5-71.*

Dish antennas 8 feet or larger, any condition. Key Code 4-47.

Remote transmitter/receiver including antennas. Key Code 4-16.

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REMOTE...WTB...CONTD.

Rust 108 remote control or spare relays needed urgently. Key Code 4-73.

Link Equipment 2 GHz, new or used for video. Key Code 3-84.

Marti Tube Receiver on 450 kc band. Marti tube or solid state receiver on 150-185 kc band. Marti transmitter 450 kc band. Key Code 3-91.

Remote Control System for AM station. Daytime, 10 KW and tower-directional. Key Code 3-94.

Microwave Equipment, used. 12 GHz cars band. Key Code 3-95.

Remote Control Units, studio and xmitter locations. In good working order. Key Code 3-47.

STEREO GENERATORS

WANT TO SELL

***Wilkinson stereo** generator. Key Code 5-51.*

***CCA Stereo Generator**, SG-1E, modular model, good condition, with manual. Key Code 5-4.*

***Gates stereo generator** (for use with Gates TE-3 exciter). Exc. cond, $300. Key Code 5-23.*

***CCA SG1E**, only 2 years old, replaced by Optimod, offers considered. Key Code 5-35.*

Gates subcarrier generator FM 2H3 Model #994-6507-001. Freq 67 KHZ. Best offer. Key Code 4-11.

Sparta/Cetec 682, as-new. $1000. Key Code 3-12.

CCA SG1E stereo generator. Excellent condition. Offers considered. Key Code 3-78.

Moseley SCG-9 New Stereo Generator. Broadcast Export Association. 800-336-3045.

RCA BTS 1-A, stereo generator, $350. Key Code 3-53.

RCA BTX-1B generator module for a BTE 15A exciter. Good condition. $350. Key Code 2-3.

WANT TO BUY

***Gates M-6146** Stereo Generator. Key Code 5-90.*

SWITCHERS (VIDEO)

WANT TO SELL

***Ampex monochrome switcher-disolver**, 2 input, rack mounted, solid-state, $50 or best offer or trade. Key Code 5-68.*

***Sony SEG-2** monochrome switcher, with manual, perfect cond, $650 or best offer or trade. Key Code 5-68.*

Hitachi EA-103 color switcher and effects generator. Key Code 4-73.

Echolab SE-2 special effects generator. Used twice. $3200. Key Code 3-71.

Dynair Switcher, poor, not working condition. Key Code 2-76.

TAPES, CARTS & REELS

WANT TO SELL

***1" tape for IVC**, Scotch 361, 10 new 60 min, 11 used 60 min, 3 used 30 min, 1 used 10 min. All for $350. Key Code 5-48.*

***Huge inventory of used Scotch**, Fuji and Sony ¾" videocassette stock. 10:00 length only $4.00/reel negotiable. Key Code 5-2.*

3M and Fuji used 2" videotape stock. All reels cleaned and evaluated. $25.00/reel negotiable. Key Code 5-2.

***Easy listening music-½ trk** stereo approx 95 reels, 25 Hz cue tones, $1000 for all, metal and plastic reels. Key Code 5-49.*

***Bulk erased 2" tape** precision reels, 1200' splice free, $20. Key Code 5-61.*

***TDK SA60** cassettes almost new, bulk erased, labeled, includes box $1/each, quantity price. Key Code 5-61.*

Video Tape 2", 1" with features will swap for ¾" cassettes, or best offer. Key Code 4-78.

Audio Tape 2551 on plastic reels. No splices 500 reels. 10½ inches, type 2551 audio tape on metal reel. New. Key Code 2-79.

¾" Videocassettes. New and evaluated used. All major brands at competitive prices. Video Tape Exchange 212-695-6644.

Premium 5 screw cassettes by box 100. C-60 for 58¢. C-90 for 72¢. Key Code 4-23.

Viking & Fidelipac NAB 1200' carts w/music tape & empty, extra tapes & parts, 50 or more @ $50. C-90 for 72¢. Key Code 4-23.

Stereo FM music tape programs, automation cue tones, music lists, masters copied 6 times, low print tape, MOR vintage 1968, excellent quality, 70 hours +, $500 for lot. Key Code 4-80.

AUDIO CASSETTES-Standard & custom lengths 5 screw shells (Made in U.S.A.) loaded with 3M or Agfa tape-COMMERCIAL USER PRICES-Call or write for catalog of supplies & services. Northwestern Inc, 1224 S.W. Broadway, Portland OR 97205. 503-226-0170.

10½ reels of 1940-60 easy listening, (quantity, over 100), mixed $200. Key Code 4-32.

Fidelipac Tape carts 1,200 40 sec-10½ min. $1000 for lot, or $100 per 100. Key Code 4-52.

Scotch Tape Stock, one inch for Ampex machines. Key Code 3-28.

78 records-1920s vintage, approximately 40 available. Would like to trade for instrumental 78s made 1945 and later, in good condition. Key Code 3-51.

Ampex Video Tape Spooler for ACR-25 carts. Type 1370650-01. Make an offer. Broadcast Export Association. 800-336-3045.

Ampex or Sony 2 inch for video tape recorder. 8-inch reels, 50 minutes, 80 available. 10½-inch reels, 2 hours, 5 available. 4 hours, 26 available. Fair to good condition. Best offer plus shipping. Key Code 3-5.

Scotch Tape Stock, one inch for IVC machines. Key Code 3-50.

Video cassettes, ¾", 30 minute lengths. Like new, hardly used. $9.50 each plus UPS shipping. Key Code 3-28.

10" Automation Reels, over 300. Some full, some partial. $3.00 each. Key Code 3-26.

U-matic video-cassettes, ¾", 60 minutes, kused. $11.00 each plus UPS shipping. Key Code 3-28.

Approximately 700 vocal 45s and a few 78s to trade for 45 and 78 instr. singles in good condition. Key Code 3-51.

Video-cassettes, 1000-10 minutes. 5 passes with cases. $2.25 each. Bulked. Key Code 3-53.

Reels 3500 pcs 10½ x ¼ NAB plastic reels and white cardboard boxes for audio tape, mixed small and large center. New items, never used. Available in lots of 500 or more. $.50 each per reel and box. Key Code 2-57.

WANT TO BUY

***Video cassettes**, ½" for Phillips/Norelco VCRs. Used, any length. Key Code 5-40.*

Old 16 inch electrical transcription. Key Code 4-81.

Country and Gospel Records, wanted for radio programs. Send quantity, condition and price by letter. Key Code 3-82.

TEST EQUIPMENT

WANT TO SELL

***Rutherford Electronics Co.** model B16 Pulse Generator. Like new. $85. Key Code 5-91.*

***H-P Test set #3550B-Like New**, including Rack, H20-204C oscillator, 353A Patch panel, 403B VTVM. $1200. Key Code 5-95.*

***Heathkit**: Lab Generator (RF), $30; Hickok Tube Tester, $20; RCA Senior Voltohmyst; $40; RF Generator, $20; Simpson VTVM, $20; Transistor Checker, $20. Key Code 5-95.*

***H-P 202B** Low Freq. Osc. 5HZ to 600 KHZ, 5 bands, as-is. $50. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***HP 400D AC voltmeter**. Calibrated, clean. $75. Key Code 5-8.*

***BC-221AA freq.** meter, 125 KHz to 20 MHz, gd. cond., with manual and calib. charts, $25. You pay shipping. Key Code 5-44.*

***B & K Dual Trace 15 MHZ** scope model 1472B. Lkie New. $450. Key Code 5-91.*

***Polyskop I model SWOB**, 400 MHZ. $400. Key Code 5-91.*

***H-P 331A** Distortion analyzer. $700. Key Code 5-95.*

***H-P 211A** Square Wave Gen. 1HZ to 1MHZ, Excel. Cond. $195. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Hewlett Packard Model 200AB audio osc.** (2 avail.), very gd cond, with manuals, $75/each. You pay shipping. Key Code 5-44.*

***Tektronix 525 waveform monitor**, perfect cond, $500 or best offer or trade. Key Code 5-68.*

***Tektronix 316A** 10MHZ scope. Good cond. and calib. $200. Key Code 5-91.*

***Room Tuning Package**: including, GR #1382 random noise generator, B&K sound level meter #2203, B&K Octave filter set #1613, B&K Precision calibrated condenser mike. $1800 for all. Key Code 5-95.*

***H-P 330B** Distortion Analyzer, 20HZ to 20KHZ, .03-300V, as-is. $150. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Stoddart PRM-1** field intensity meter, $300. Key Code 5-26.*

***Hewlett Packard Model 310A** wave analyzer, exc. cond., with manual, $1200. You pay shipping. Key Code 5-44.*

***Eico capacitor checker**, Knight signal generator, old scope, all as is, all for $50 plus freight. Key Code 5-74.*

***Sencore**: PS 148 scope, $70; and PS 120 scope, $30. Key Code 5-95.*

***Leeds & Northrup 5430A**, Wheatstone Bridge/cable fault finder, good cond. $95. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Electronic** test equipment and parts for sale. Write for list. Key Code 5-7.*

***Tektronix Model 514-D** oscilloscope, good cond., with manual, $150. You pay shipping. Key Code 5-44.*

***Tektronix RM31A**, with dual trace plug in and calib. Rack mount. $275. Key Code 5-91.*

***H-P Test Set**: Rack, 204C oscillator, and 353A Patch panel. $500. Key Code 5-95.*

***B&W Mod.** 400 distortion meter. $100. Key Code 5-95.*

***Bendix**/Military BC221/MC Frequency Meter/Osc., 125KHZ to 20MHZ, with Cal. book, not checked out, as-is. $50. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***General Radio Distortion Analyzer**, clean. 50-15K. $175. Key Code 5-8.*

***GR bridge, 916 AL**, mint cond, $570. Key Code 5-26.*

***Telonic Model HD-7** sweep generator, 100 KHz to 100 MHz, very gd cond., with manual, $375. You pay shipping. Key Code 5-44.*

B & W Distortion meter model 410. Key Code 4-40.

BC-221 Freq. meter, good condition, $20. Key Code 4-49.

Hewlett-Packard Model 130C oscilloscope, good cond. with manual. Key Code 4-66.

Tektronix 545A w/dual trace plug in. very clean cond. $375. Key Code 4-68.

HP 330D distortion. Looks good, works OK. Needs calibration. With manuals. Make offer. Key Code 4-24.

Heathkit SB-610 Oscilloscope. Key Code 4-40.

Barker & Williamson Model 200 low distortion audio oscillator. Good cond., with manual. Key Code 4-66.

Tektronix 535A dual trace plug in. very good. $350. Key Code 4-68.

Tek 310A scope, excellent cond. Tek probe, recent cal $300. Key Code 4-72.

Nems-Clarke AM Field Strengh Meter, Model FLM-135. Reads from 100 MV to 10 V over AM Broadcast Band. Good condition, $300. Key Code 4-7.

Eico metered audio gen. good cond. 600 ohm bal. term, or hi-Z output, $50. Key Code 4-72.

Monsanto 1500 series counter plug-in, to 3 GHz. New $125. Key Code 4-91.

Ballentine Audio Voltmeter. Type 302-C rack-mounted. Battery power supply type, batteries not included. $35. Key Code 4-60.

General Radio AC VTVM new condition. $35. Key Code 4-49.

Hewlett Packard 5326A, universal timer-/counter. Less than 5 years old. Good to excellent condition. $1100. Key Code 3-48.

Hewlett Packard 330-B noise and distortion analyzer. Excellent condition with manual. $250. Key Code 3-30.

Oscilloscope B & K 1471BP, dual trace, 10MC. Used little, mint condition. $550 with manual. Key Code 3-61.

Hickok Digital Voltmeter, rackmount. Early nixie type. $25 as is. Key Code 3-42.

Tektronix 561B scope with 2A63 differential amp and 2B67 time base plug-ins. $250. Key Code 3-49.

Leader LCG-389, color bar, croshatch generator, used little. Excellent condition. $60 with manual. Key Code 3-61.

Tel-instrument 2123A channel 2. R.F. picture signal generator. Working condition. Best offer plus shipping. Key Code 3-5.

V.T.V.M., B & K 177, excellent condition. $100 with manual. Key Code 3-61.

Tektronix RM 527 waveform half rack in good condition. Working. Key Code 2-76.

Meguro Deupa wow-fluter meter with frequency counter. Measures to .03 percent. Full scale. $400. Key Code 2-51.

WANT TO BUY

Tektronix 528 Waveform Monitor. Key Code 4-18.

Tektronix 529 Waveform Monitor. Key Code 4-18.

Audio Attenuator Unit for proof-of-performance use. Would prefer one well-used. Good condition and complete. Key Code 3-51.

Audio Tone Generator, transistorized. Key Code 3-11.

FM-TV Field Strength Meter. Good condition. Key Code 3-30.

RCA WV-98C VTVM, complete and good condition. Would prefer one of late vintage. Reasonable price paid. Key Code 3-51.

Eico 460 five-inch oscilloscope in good condition and complete. Reasonable price paid. Key Code 3-51.

Bird 43, thru-line meter. Key Code 3-91.

Frequency Counter, with 1 GHz capability. Used, reasonable. Key Code 3-95.

AC voltmeter, for audio testing purposes. Recent model needed well-used, but good condition and operable. Key Code 3-51.

Eico 378 audio generator. Discrete freq, metered. Good condition. Reasonable price paid. Key Code 3-51.

Dummy Load for 5,000 watt AM transmitter. Key Code 3-91.

Heath TT-1-A tube tester, with TT-1-AA adapter and all chars and manuals. Well used, but good condition. Key Code 3-51.

Variable AC power supply. Zero-to-full voltage, with meter, in good condition. Reasonable price paid. Key code 3-51.

B & W 410 distortion meter. Key Code 3-91.

Hewlett-Packard 3580-A spectrum analyzer. Key Code 2-51.

TRANSMITTERS

WANT TO SELL

Gates M-6095 exciter, $350. Key Code 5-75.

***McMartin TBM 25000-C** RF amplifier. Key Code 5-17.*

Gates 3KW FM transmitter (2). Key Code 5-36.

***Ratheon RA-1000**. Excellent condition. $1100. Key Code 5-18.*

Wilkinson FM 1000-E broadcast transmitter. Key Code 5-17.

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TRANS....WTS...CONTD.

***RCA BTA-50H1S** 50 kilowatt AM amplifphase. BTE-20A solid state exciter with 5KW cutback. Exc. cond. $35,000. Key Cond 5-20.*

FM Transmitters (used), 20 KW, 15 KW, 10 KW, 5 KW, 1 KW, 250 W. AM Transmitters (used), 50 KW, 10 KW, 1 KW, 500 W, 250 W. Contact Communications Systems Inc, Drawer C, Cape Girardeau MO 63701. 314-334-6097.

***Wilkinson FM-10** solid state exciter. Key Code 5-17.*

***Westinghouse FM 10KW** final and power supply. Key Code 5-36.*

***ITA-Wilkinson**, 10-watt exciter less power supply, new tubes, $400. Key Code 5-49.*

Gates M-6095 10 watt FM exciter, good cond., tuned 88.3 MHz. $325. Key Code 4-29.

AM 1 KW Vanguard II, used on air until Sept. 78, spare parts and final tubes, 10 years old. Key Code 4-17.

10 KW RCA FM, complete 'B', was working when removed from service, now disassembled. As is, $1,000 or offer. Key Code 4-72.

Western Electric 405-B2 5 KW needs some repair. Best offer includes manual. Key Code 4-35.

RCA BTA-50H1S 50 kilowatt AM xtr. 9 years old. With solid state exciter, spare tubes. Presently tuned to 1170 KHz. Make offer. Key Code 4-92.

RCA BTA-250K presently tuned to 950 KHZ, $500. You haul. Key Code 4-13.

Western Electric 1937, 50 KW AM transmitter, $11,000. Call (800) 336-3045.

CCA FM 3000D now operating 91.5. Type approved to 3.5 KW. Excellent condition, with single phase AC. Key Code 3-14.

QEI solid state exciter. Excellent condition. Same as new. Key Code 3-18.

Gates FM-5B 5 KW FM Transmitter. Recently taken out of service, fair condition. $1500 or reasonable offer. Please call for details. Key Code 3-63.

CCA FM 10DST exciter. Excellent condition. All offers considered. Key Code 3-78.

CCA FM 3000D, no exciter. Now operating 91.5 type approval to 3.5 KW. Operates on single phase AC. Key Code 3-87.

Gates BC-250-D 250 watt transmitter. Key Code 3-35.

Gates 250-Gy, AM 250/100 watt transmitter, with manuals. Some spare tubes, tuned to 1230 KHz. Replaced due to increase in power. Key Code 3-57.

Gates BC1-E 5000 watt transmitter. Mfg. 1948, inoperative. For sale, whole or parts. Key Code 3-72.

Collins 786W-1 SCA generator card used in 310 series FM exciters. Excellent condition. $500. Key Code 3-17.

Gates M-6095 exciter. Made last proof. Factory rebuilt in 1976. $350. Key Code 3-30.

Collins 40F oscillators in good condition. One recently overhauled. Key Code 3-60.

WANT TO BUY

***Collins 300 AM** transmitter or parts. Key Code 5-36.*

***Gates FM-1H or Gates FM-2.5H FM** xtr. Key Code 5-51.*

FM transmitter, 250 watt, mono or stereo. Key Code 5-67.

FM stereo exciter, Collins 310Z-1 or similar. Key Code 5-69.

***CCA FM10DS** direct FM broadcast exciter. Key Code 5-38.*

***R.C.A. BTA-1R 1KW AM** transmitter. Key Code 5-7.*

RCA Harmonic filter MI-27967 tuned to 99.1 MHz (5000 watts). Key Code 5-38.

Collins 20V, 1KW transmitter or parts. Key Code 5-36.

***Old Model Collins 5KW** transmitter, parts, also transformers. Key Code 5-36.*

TV translator 1KW or transmitter with 1 KW stage retunable for UHF. Key Code 5-50.

Wanting 250, 500, 1,000 and 5,000 watt AM FM transmitters. Guarantee Radio Supply Corp., 1314 Iturbide Street, Laredo, TX 78040. Richard Reyes, 512-723-3331.

RCA BTA-1R, BTA-5R, BTA-5S, BTA-5T, BTA-5U AM Transmitter. Key Code 4-9.

Equipment to outfit Class A FM Station. Need tower, transmitter, console, etc. Key Code 4-53.

ITA 1 kw in excellent condition A.M. Key Code 4-86.

Adler TV translators, any condition. Key Code 4-94.

Visual 3 kw FM transmitter in excellent condition. Key Code 4-86.

RCA BTA-1-R Transmitter. Key Code 4-15.

F.M. Broadcast Transmitter-500 watts 1kw or even 250 watt. Key Code 4-38.

Collins or Gates, used, any condition, 1kw AM xmitter. Will repair. Key Code 4-41.

ITA 5 kw in excellent shape AM. Key Code 4-86.

5000 Watts AM Transmitter, must be in excellent working condition. Reasonably priced. Key Code 3-47.

Transmitter, 20 KW FM. Key Code 3-81.

FM Exciter. Solid state for CCA stereo. Key Code 3-91.

2.5, 3 or 5 KW FM Transmitter. Key Code 3-92.

50 Watt Transmitter, for AM broadcast. Key Code 3-94.

UHF Transmitter for channel 14,10 to 55 KW. Key Code 3-34.

All Equipment for 50,000 AM Station, overseas. Will consider new and used equipment. Would like to purchase with B-X Exchange Credits or Exchange Enterprise Credits. Both are large bartering organizations. Key Code 3-83.

RF Linear Amp, 250-500 watts. For use with Gates TE-3, FM broadband. New or used. Broadcast Export Association, 800-336-3045.

FM transmitter, prefer BTF-10E. Late model 10 KW. Key Code 3-22.

FM Transmitter, late model. 10 KW, 20 KW or 25 KW, with or without stereo generator. Key Code 3-44.

LPB Carrier Current Xmitter, 5-10-20 watt model, regardless of condition. To be used as auxiliary. Key Code 3-59.

Transmitter, 250 watt to 1 KW FM, with or without exciter. Good condition, will pick-up. Key Code 3-62.

Collins 820-F1. or Continental 10 KW AM. Key Code 3-85.

10 KW AM Transmitter, prefer a Bauer to match tubes of our current unit. Good condition. State terms. Key Code 3-36.

AM Transmitter, 100 to 250 watts for carrier current installation. Not older than 20 years. Key Code 3-45.

TUBES

WANT TO SELL

JAN-CBXT 8161 Eimac tubes (4-new). Key Code 5-36.

4-1000A (new). Key Code 5-36.

891 (3-used). Key Code 5-36.

872A mercury vapor rectifier tubes, (three), new, never used, half price..Key Code 5-65.

892 (3-used). Key Code 5-36.

RCA 6161 for TTU series Trans., Quantity 3, New Unboxed, 30% of Cost. Key Code 4-4.

Tubes: Two each 845 and 872-A probably used, condition unknown. Make offer. Key Code 4-24.

Protector Tubes, RCS 5AZP4, one each red, green, blue, with few hours use. $50 each. Key Code 3-52.

WANT TO BUY

125A tubes (4). Key Code 5-36.

GTE color slide studio tube for Model CSS-1. Key Code 5-14.

250A tubes (4). Key Code 5-36.

400A tubes (4). Key Code 5-36.

Telefunken VF 14 for U-47, U-48 microphones. Telefunken AC-701. Key Code 4-83.

TURNTABLES & LATHES

WANT TO SELL

***Mono Neumann Lathe**. $5000. Key Code 5-95.*

***Rekocut Rondine turntable**, fair cond. Key Code 5-27.*

***Microtrak 306 tonearms**, two available, good cond. Key Code 5-27.*

***RCA BQ2B** in cabinet with Shure M-236 arm. $50. Key Code 5-22.*

***Collins** twelve inch turntable, fair cond. Key Code 5-27.*

***Gates CB-500** 16" turntable with mounted Grey tonearm, $75. Key Code 5-23.*

***Rekocut A-60** tonearm, fair cond. Key Code 5-27.*

***Gray 208S** tonearm, fair cond. Key Code 5-27.*

***CCA 12-72** turntables with Shure arms, 3 year old, 2 each, new motors. Best offer. Key Code 5-9.*

***Gates CB-500** turntables, four available, good cond. Key Code 5-27.*

***Rekocut S-260** tonearm, two available, good cond. Key Code 5-27.*

Technics SL-20 Turntable. New condition $100 w/spare plug in shell. Key Code 4-49.

Technics direct drive. Dependable, quiet, low maintenance, well engineered. Also cartridges and preamps. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel. 608-257-7722 or TWX 910-286-2745.

Ortofon 16 inch tone arms with four pin removable head shell 2 each at $25 or trade for 12 inch. Key Code 4-59.

Gray turntables, quantity (2), tone arms, quantity (2), syn. motor as is, quantity (1). $60. Key Code 4-48.

Russco Studio Pro 33/45 with Microtrack arms, Stanton cartridges, 2 available. Key Code 4-57.

Russco turntable. Like new. Its a repo. $150. Key Code 4-85.

Sparta/Cetec GT-12SY synchronous, with Microtrack 303 arm. Used 18 months. $325 per system. Key Code 3-12.

Russco Studio-Pro turntables, good condition. Two available at $75 less tone arms. Key Code 3-63.

Gray Arms 16 inch-broadcast transcription arms. Make offer. Key Code 2-19.

Rek-o-kut B-126H. 2 each in working condition. $25 each. Key Code 2-2.

WANT TO BUY

Turntables, Russco & QRK 12", $150 for (2) tops. Key Code 5-43.

Turntables and arms. Key Code 4-41.

Gates, HI-Watter series M-5202 16 inch less arms. Motor can be bad but rest of unit should be okay, or salvage condition. Key Code 4-77.

Collins, model TT 200-S. Key Code 4-21.

Pre-1950 turntables and arms. Western Electric, RCA, Gray, Fairchild, Presto, Rekokut, etc. Key Code 4-33.

RCA 70-C1 16" turntables. For parts, not interested in the cabinets. Key Code 4-49.

Shure, model SE-1 phono preamps, quantity-2. Key Code 4-21.

Technics SP10 Direct drive, 2 needed, in good condition. Key Code 4-57.

Gray Viscous damped arms. 12" or 16". Other old arms considered. Key Code 3-42.

Gray, Gates, QRK, used 12 inch tonearm, for carrier current AM station. Key Code 3-59.

Studio-pro Turntables, but will take any reasonable offer. Must be in good condition. Two needed. Key Code 3-73.

TV FILM EQUIPMENT

WANT TO SELL

***Canon DS-8** Super 8mm camera with F1.4, 7.5-60mm, 1-8 zoom, automatic aperature, carrying case, 2 synchronized cassette recorders, 3 filters, and extra NiCad power unit and charger. Cost over $1700 new, excel. cond. $795. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***16mm Edit Bench Kit:** Magnasync/Moviola frame counter/tuner and winders, Murray viewer, and Bolex splicer. Excel cond. $295. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Telecine island with Laird 5300**, FP 1200 camera, Bell Howell 16mm projector, Spindler-Saupe 35mm. Key Code 5-42.*

***Bolex SM-8** Super 8mm projector-with sound, excellent cond. $225. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***TV Film, Shot-Gun Microphones**, Lavaliers and wireless. Sony, Shure, Sennheiser, ElectroVoice, AKG, AudioTechnica and Clear-Com. Sales, rentals, new, used and demo. Also mixers and recorders for sale and rent. Full Compass Systems, 55 N. Dickinson, Madison WI 53703. Tel: 608-257-7722 or TWX 910-286-2745.*

***Kodak TV M-100-A** Super 8 projector for film chain or normal use. Like new, sealed bid to open June 20. Mark outside envelope "Super 8 Bid", minimum bid $750. Key Code 5-48.*

Athena 4000 16mm telecine projector, factory refurbished, at less than half the price of current Mark IV. Key Code 3-64.

WANT TO BUY

35mm Film projector with television three to two pull down. Key Code 5-92.

O'Connor Tripod head. Key Code 4-78.

VIDEO PRODUCTION EQUIP.

WANT TO SELL

I.O. camera chains, 3 inch. RCA TK-14 with zoom lenses. Key Code 5-83.

***Sony VTR system:** 21" B/W monitor with tuner, 7" x ½" reel recorder, camera (B/W), tripod, microphone, cases, cables, $650 for package. Key Code 5-74.*

***RCA TG-2** sync generator. Key Code 5-83.*

***Houston Fearless pedestal**, PD-3, perfect condition, $500 or best offer or trade. Key Code 5-68.*

***Concord MR750** Receiver-monitor, 9 inch solid state. $150. Key Code 5-91.*

***Davis & Sanford** floating action tripod "B" & head, excel. cond. $175. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***RCA TR-22** monochrome, worked fine when removed from service, $1000 or best offer over. Key Code 5-64.*

***Conrac KNB9** monochrome 9" monitor with manual, $125 or best offer or trade. Key Code 5-68.*

***RCA Waveform TO-2**. Very clean. Like New. $300. Key Code 5-91.*

***Kodak AF-2** Ektagraphic Slide projector with auto-focus and timer, excel. cond. $195. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***International Nuclear Corp**. Model TVM-2 video modulator to feed TV receiver IF strip bypassing tuner, $50. Key Code 5-15.*

WANT TO BUY

Sony 3/4" Recorders/Players, Film Chain Equipment and Color Monitors.

Ronald Phillips, P.O. Box 19149
Kansas City, Mo. 64141 816-221-2720

In Mexico call Guarantee Radio 512-723-3331

In the U.S. call 800-336-3045 For any Key Code Names and Addresses.

In Canada call United Video 613-741-5554

The Exchange

VIDEO PROD....WTS...CONTD.

***Conrac CQF-14** monochrome monitors, 2 units, high resolution, with manual, 2 for $150 or best offer or trade. Key Code 5-68.*

***Ampex AC-116**, SEG. $150. Key Code 5-85.*

***Reynolds/Leteron** Mod LE-200 Titler machine with 3 alphabets. In carrying case, excel. cond. $225. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***Chyron IIIB** stand alone font create system. 1 yr. old in excellent condition. Call for list of components. Key Code 5-12.*

***Advent** 7' projection TV/monitor, Videobeam 1000A. Retails approx. $4400, sell for $2600. Key Code 5-53.*

Hitachi SG-108 color sync generator. Key Code 4-37.

Bud Classic II equipment rack, video distribution amp., and Telemation uniplexer. Key Code 4-37.

Panasonic rack triple, loop sync/video or term, inter/ext sync. just overhauled by Panasonic. 3 separate monitors in unit. $200. Key Code 4-72.

Panasonic TR-910VN 9" video monitor-receiver, interfaces with NV-3020SD VTR, $100. Key Code 4-64.

Dage Tube Type Sync. Gen. B&W, G.E. TG-2 Solid State Sync. Gen. Cheap with manuals. Key Code 4-4.

Panasonic WV-200P b&w camera, very small size w/new vidicon, excellent cond. $150. Key Code 4-64.

Monitor Conrac C2B8, good cond, $150. Key Code 4-68.

Rack of video DA's, 8 cards, loop input, 4 output each, plus monitor, ps. all in card frame, new $1500. Key Code 4-72.

Dage 14" B&W monitor. $40. Key Code 4-4.

International Nuclear TC1 clamp amplifiers, quantity-2, $50. each. Key Code 4-18.

Monochrome TSG-200 sync gen. solid state, good cond. $200 or offer. Key Code 4-72.

Remote Van, 1970 GMC Boyertown 20' step van, with A-16 track audio console and 3 ea 6' rack cabinets. Contains complete set of video equipment. Also intercom system and complete set of mikes. No recorders currently on board, but colorpack cameras are available. Will sell as package or as components. Call or write for complete list. Key Code 4-93.

EA-5 Computerized editing control unit. Will interface with most ¾" editing V.T.R.s. Key Code 3-24.

IVC 4102-03, time base corrector. $600. Key Code 3-52.

Sony CMA-6, used twice, $375. Key Code 3-71.

Microtime 2020, plus, brand new TBC including enhancer and noise reduction, sacrifice. Key Code 3-75.

KSN TC100B time base corrector U-matic compatible, includes processing amp. Used less than 25 hours, with manual and schematics. $500. Key Code 3-39.

Setchell-Carlson triple black and white bank, used twice. $550. Key Code 3-71.

Weircliffe Model 8, bulk eraser. Will erase 2" x 14" reel in 15 seconds, with video loader. Key Code 3-96.

Videotek RM 21, monitor/receiver. 21", like new. $875. Key Code 3-71.

Microtime 1600 broadcast TBC, brand new with image processing built in. Must sell cheap. Key Code 3-75.

Vital Industries processing amplifier. Average, not working condition. Key Code 2-76.

RCA TA-33 video DA. Rack of 4 plus power supply. Clean but not working. Key Code 2-76.

Ampex C-116 special effects generator. $100. Key Code 2-30.

Conrac Demod. Fair, not working. Key Code 2-76.

Fairchild black and white sync generator. Clean and working. Key Code 2-76.

Telemation TMV-400 black burst generator. Clean, working. Key Code 2-76.

WANT TO BUY

***Kodak Supermatic VP-X** player. Must be in excellent working condition. Key Code 5-6.*

***RCA monoscope camera**. Any condition. Key Code 5-91.*

Synthesized 2 MTR FM and ½" b&w portapack w/camera, have various audio & video gear to swap. Key Code 4-64.

Switchers, Chains, Cameras, Recorders and nearly everything except the tower for a new TV station. Key Code 3-34.

VIDEO TAPE RECORDERS

WANT TO SELL

***Ampex** VR-5100, $245; VR-7550, $295; IVC 800 AS/M, $495. Autodyne, Box 13036, Orlando FL 32809. 305-855-6868.*

***JVC videotape CR-6300U**, new, w/warranty, remote control unit, Bretford rolling-base production cabinet, $1500. Key Code 5-53.*

***IVC Model 850 full color 1"** in excellent condition, rack mounting. $825. Key Code 5-15.*

***AKAI**, ¼" VTR, B/W R-R Portable with camera tuner & monitor like new. $500. Key Code 5-80.*

***Ampex 5100**, one inch VTR-needs head. Best offer. Key Code 5-85.*

***Sony 1000 VCR** ¾" U-matic player. Key Code 5-32.*

***AKAI 700 Deck** complete electronics, ¼" VTR like new. $375. Key Code 5-80.*

***Sony 1200 VCR** ¾" U-Matic player. Key Code 5-32.*

Sony CV 2200 plus tapes, $200. Key Code 4-47.

Panasonic NV-3020SD ½" EIAJ reel to reel VTR in excellent condition, $200. Key Code 4-64.

Concord VTP-360 ½" color reel-reel video tape player. Key Code 4-37.

Sony ¾ inch casette editing unit 2850, $2500. Key Code 4-78.

Used RCA Low-Band modules, $30. each. Key Code 4-18.

VPR-1, one with portable case, one with rack mount. $21,000 or an offer. Key Code 4-30.

Ampex MK X Video heads, some unused since refurbishing. Best offer accepted in 30 days. Key Code 4-62.

Ampex 7800 color VTR. Needs head. $400. Key Code 4-68.

Sony portable ¾" professional recording unit, complete, $2500. Key Code 4-78.

VPR-1 AST/TBC-1 portable case $45,000 or offer. Less than 200 hours on each. Key Code 4-30.

Ampex MK III video heads, 10 mil and 5 mil available, all used. Best offer accepted in thirty days. Key Code 4-62.

Ampex VR660B. Dual audio and manual, in working condition. Have three other units without video and servo P.C. boards. May be used for parts. Best offer plus shipping. Key Code 3-5.

Ampex VR-1000B less monitoring. Trade for character gen. or 5-channel audio board and 2, 12-inch turntables. Key Code 3-9.

Sony CV2200 with 8 tapes. Tuner available. $200. Key Code 3-10.

RCA TR2 VTR with air bearing heads. Key Code 3-38.

IVC 960 video tape recorders, 3 each, with IVC4102 TBCs, 3 each. $7500 for the lot. Key Code 3-49.

Sony 1" EV 320, excellent condition. New heads. Used 3 hours. $500. Key Code 3-68.

Sony 2800 ¾" U-matic recorder player. Key Code 3-28.

Ampex 1002 VTR, solid state MPA, 05 intersync, monitor bridge, solid state elec. editor, Key Code 3-38.

Ampex Video Tape Spooler for ACR-25 carts. Type 1370650-01. Make an offer. Broadcast Export Association. 800-336-3045.

Sony PV-1200 Helical VTRs. All operate but need video heads, with 60 used 90 minute tapes. 3 available for $600. Key Code 3-16.

Sony 2600 ¾" U-matic recorder players. $975 each plus shipping. Key Code 3-28.

IVC 820C color video tape recorder with video monitor head. $500. Key Code 3-49.

CLP 1-B. 2 color packs for EV-320 VTR; need alignment. $250 each. Key Code 3-68.

Ampex Colortec 1011. Ampex Amtec 1060. Excellent condition. Key Code 3-97.

Sony 2850 ¾" U-matic recorder player. Key Code 3-28.

Sony EV320F with color pack CLP-1B, new. Both for $950. Key Code 3-32.

JVC 6300 ¾", excellent condition. $1500 and freight. Key Code 3-37.

Ampex Colortec, Amtec, Procamp-$2500. Key Code 3-49.

Panasonic NV3110 ½" color video tape player with RF adapter. $125. Key Code 3-49.

WANT TO BUY

***VHS format video** recorder/player. SP and LP mode, any brand in good cond. Key Code 5-40.*

***Ampex VP4900 VTP**, need rotary transformer and head assembly. Key Code 5-40.*

***RCA TR-3 or TR-4** quad machines, low band or high band, will pay cash or trade. Key Code 5-68.*

Portable E1AJ like AV 3400, NV 3082, PU4500, etc. Must be mechanically complete. Key Code 4-61.

Panasonic NV 5000 color disc recorder/reproducer. Key Code 4-89.

JVC 4100 Portable VHS recorder, new or demo. Key Code 4-61.

VR-1200 B or C with all or most of goodie options. Will trade 1 or 2 VPR-1's as part of deal. Key Code 4-30.

Westel one inch color VTR, Model WRR350. Key Code 4-89.

Westel one inch color record only portable VTR Model WR 201. Key Code 4-89.

Sony two inch helical production VTR w/editor and D.O.C.-Model MV 10,000. Key Code 4-89.

VHS format video recorder/player. RCA preferred, but will take any reasonable offer. Key Code 3-73.

In the U.S. call 800-336-3045
For any Key Code Names and Addresses.

800-336-3045

New Listings are in *Italics*.

DIGITAL PROPOSAL

...from page 11

Error Correction And Concealment

For any professional recording format to be accepted, its error correction mechanism must survive the typical data drop-outs that will occur during playback. This format was designed so that the vast majority of drop-out occurrences do not harm more than one sub-block in a sub-block triad. Additionally, it is important that multi-drop-outs have a small probability of disturbing more than two sub-blocks.

Figure 4 shows a general representation of the three sub-blocks of a triad dispersed on the magnetic tape. This dispersion is both longitudinally along the tape and transversely across the tape. If a drop-out causes errors in an even data sub-block, the odd sub-block and the parity sub-block of that triad are used to absolutely regenerate the data that was in the even data sub-block. This represents the vast majority of error occurrences and results in complete error correction.

But if two separate drop-out occurrences cause errors in both a data and parity sub-block of a triad, as shown in figure 5, the samples in the remaining data sub-block are used to interpolate the lost samples. This results in a very good approximation that is called error concealment.

If both data and sub-blocks have errors, the recorder holds the last good sample until the next good one.

Ampex has conducted an evaluation of various concealment schemes using many types of program material specifically selected to expose concealment. Listening tests with concealment of errors representative of this format has shown that skilled listeners find it extremely difficult to detect deliberately repetitive interpolative concealment even when they know precisely when it is occurring.

A significant advantage comes to this format through the use of two tape tracks per audio channel. If one

(Continued on page 23)

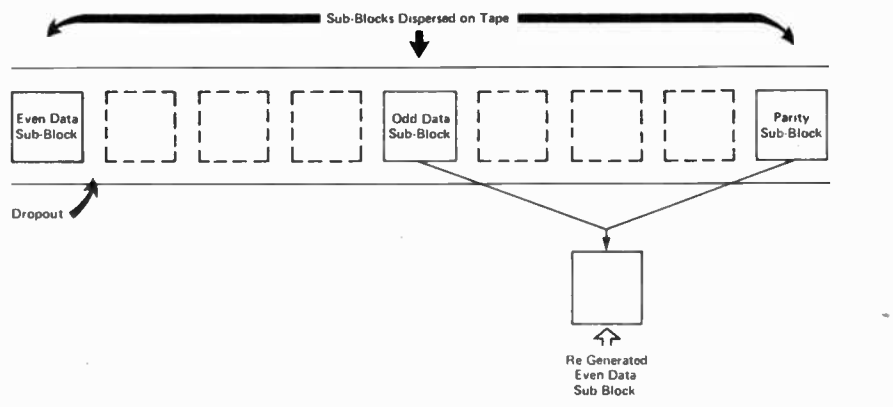


Figure 4. Error correction using data and parity sub-blocks

DIGITAL
...from page 22

track of a channel fails during playback, catastrophe is averted! The remaining good track allows complete correction on half of the remaining data sub-blocks and interpolative masking on the other half. This is because half of the parity sub-blocks are in the remaining good track and are used to regenerate half of the lost data sub-blocks. The other half of the data sub-blocks lost are interpolated from the data sub-blocks remaining in the good track. The result of the loss of one track of a channel pair is complete correction alternated with interpolative concealment every 0.2 ms, a more acceptable situation than the complete loss of a channel.

This format was designed to provide the performance and operational features needed for professional and semiprofessional recording applications both in the near future and for those which will be a part of digital recording studios of the future.

We chose two tracks per channel not only to initially provide reliable recorders but to always provide the avoidance of catastrophic failure if one tape track fails.

A significant feature of this format is the ability to do insert recordings without any disturbances to audio recorded before or after the insert. This allows "punch-in" recording as is now done on analog recorders.

We believe this format to be the basis for the professional digital recording standards of today *and* tomorrow.

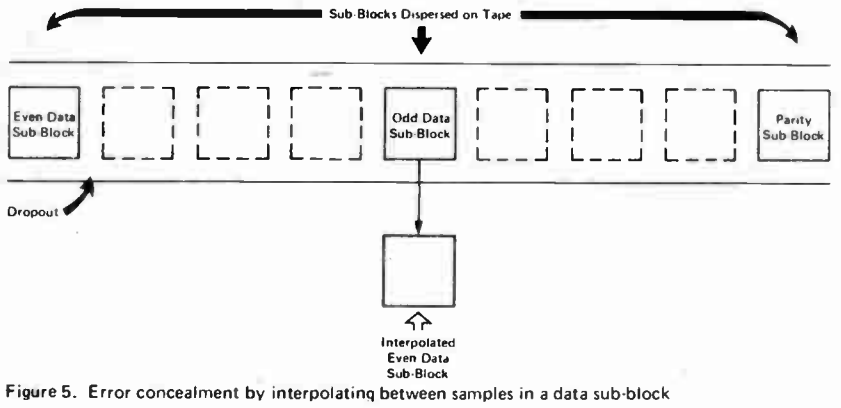


Figure 5. Error concealment by interpolating between samples in a data sub-block

TRC-15A
...from page 9

The modification becomes a matter of removing the calibrate pot wires from the metering demodulator board terminals 7 and 8. Connect these wires across the meter leads on terminals 9 and 10 of the metering demodulator. Install a fixed resistor (typically 5.1K) across terminals 7 and 8 of the metering demodulator board to set the monostable pulse width. The value of this resistor may vary. Too high a value will make it impossible to zero the meter. Too low a value will make it impossible to adjust the meter to mid-scale with "calibrate-raise."

With this modification, calibration becomes a simple two-step affair. Push calibrate and adjust the zero control for zero indication. Push raise and adjust the calibrate control for mid-scale. It is no longer necessary to re-adjust the zero control after making this modification.

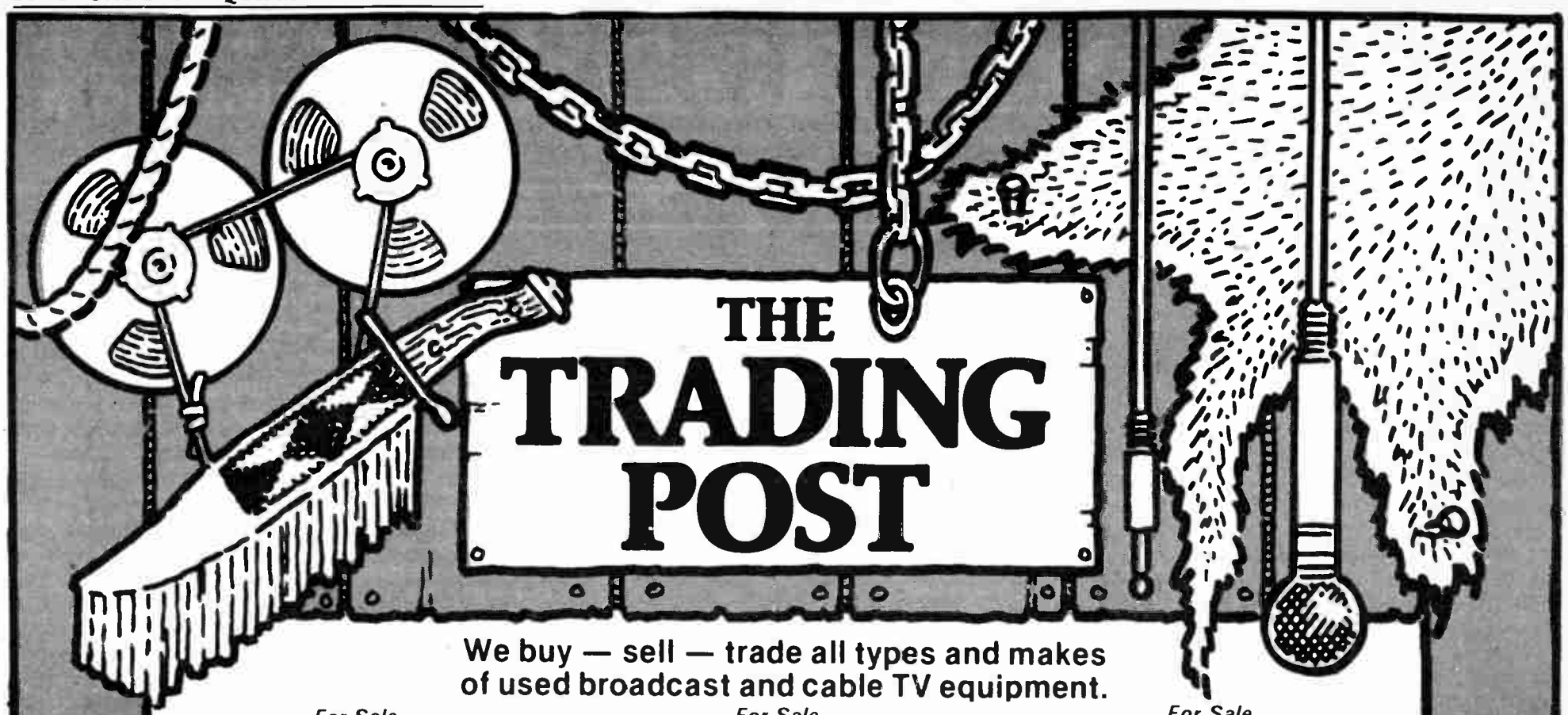
VTR's
...from page 12

Televisa's broadcast services and to provide additional production capability. The Ampex VPR-2 helical scan videotape recorder/reproducer has become the most popular product ever made by Ampex since its introduction April 1978.

System Features

The system features Ampex's exclusive automatic scan tracking (AST)[s] system that provides broadcast quality slow motion and still frame playback. The VPR-2 also provides built-in frame accurate editing, variable play and shuttle features. The teleproduction recorder is designed for professional broadcast, CCTV and post-production use, together with its companion digital time-base corrector, the Ampex TBC-2.

The Ampex VPR-20 is a portable high-band color unit with full record capability that fulfills the need for a high-quality field production recorder to complement the VPR-2, as well as for electronic news gathering (ENG) and other remote production situations. The unit has full playback electronics, allowing its use in the studio in conjunction with a time base corrector such as the TBC-2.



THE TRADING POST

We buy — sell — trade all types and makes of used broadcast and cable TV equipment.

For Sale

American Data switcher with custom cab

Ampex KHH-25 colour monitor

Danscoll TSP-101 proc. amp.

Edcor wireless microphone and receiver, new.

Electrohome ETV-7 monitor/receiver
Eumig Super 8 projector

Hitachi FP-100 camera, good cond.

IVC-100 camera

Mac Lab 824 audio mixer

McCurdy 710U intercom system, like new.

NEC VC-7410 VTR

Quick Set tripod, Gibralter 6312 cradle head, Hercules 6502 dolly

Richmond Hill EVS-7 switcher

3 Richmond Hill VDA-41 video distribution amps.

Sony CVM-192 monitor

4 Sony CBM-920U colour televisions, excellent cond.

Sony CVM-1920 19" colour television,

Sony VPP-2000 video projection system w/ screen

2 Sony AV-3600

Sony AV-3200 camera kit w/ viewfinder

2 Sony VP-100 playback VTR's

2 Sony VO-1600 ¾" rec/play videocassette

Topaz frequency changer, exc. cond.

Viscount 5V2FE video mixer

Zeimark 3100 multiplexer

Scotch '400', '420', and Memorex Chroma 90 2" quad tapes, used only for mastering. Limited quantity left.

RCA TR-3 black and white video tape recorder, playback only.

RCA TR-4 black and white video tape recorder rec/play.

Tektronix 525 waveform monitor, needs some work.

McMartin TBM-3000 FM frequency monitor 92.7

For Sale

RCA BW-73A FM multiplex monitor.

Hewlett-Packard 335B frequency monitor.

Miscellaneous IVC equipment and accessories.

3 Ampex VR-7900 video tape recorders, 2 good cond., 1 fair.

Flike 910A true R.M.S. voltmeter 10hz to 7mhz.

Ballantine 340 R.F. millivoltmeter 300uv to 3v to 1000 mhz.

J Flike 821AR differential DC voltmeter 0 to 500v accuracy .01%

H.P. 521L counter

H.P. 310A wave analyzer

Sierra selective voltmeter NEKS range 40khz to 600khz.

H.P. 562A digital recorder used with 5245L frequency counter

H.P. 150A oscilloscope

H.P. 650A oscillator frequency range 10hz to 10mhz metered output.

Polaead FIM-2 field intensity meter

Marconi OA-1094 spectrum analyzer

2 Ampex VR-1100 video tape recorders

Ampex 5800 video tape recorder

Ampex 5200 video tape recorder

Ampex 7500, 7100, 5100 and 7000 video tape recorders

Ikegami ITC-7001 3 tube self contained high resolution, 6 X 1 zoom lens rear control color camera, good cond.

Ikegami VR-624 camera with Silicon or Vidicon tube option, good cond.

Panasonic mobile c/w 3 camera, 2 WV-350, 1 WV-220, 1 switcher WV-600 audio mixer/monitor, etc, good cond

Sanyo 2000C video tape recorder /playback EIAJ color, good cond.

Sanyo 2000 rec/playback video recorder, good cond.

For Sale

ITC VF-2020 black and white camera w/5" viewfinder, remote panel, 50' cable and 2-1 sync generator, good cond.

ITE VF-301 camera w/5" viewfinder, 2-1' remote panel, 50' cable, option or self-cont., good cond.

Audiotronics camera w/4" viewfinder, 12V DC/110C AC int. ext.

Hitachi TIE 15R camera.

Philips EL-000 camera, int./ext. w/7" viewfinder

Hitachi VFM-104 switcher, good cond.

Philips 8 X 2 switcher w/ preview and intercom.

Ramco audio mixer, 6 input, good cond.

RCA 4532 1" tubes Tivicon, Saticon.

Akai 700 video tape recorder

Sony AV-3610 video tape recorder

Sony EV-210 VTR

Sony EV-310 VTR

Sony EV-320 VTR

Sony CV-2100 VTR

2 Sony CLP-IB colour pack

Sony PV-120U VTR

Philips/Grundig LDL-1000 ½" VTR

MVR disc VTR

Conrac 23" B & W monitor, tube type, qty. 23

Shibaden SP-2000 camera

Topaz 1000 frequency changer

Hitachi FP-100 camera

Koler generator 115/230V on stand w/ radiator, output 10KW, good cond.

Panasonic JV-1520 VTR

2 Sony AV-3400 portpak

Strand Century lighting, CPD-1 six pak w/ 6-3.6 KW modules, 12 TLE 20A Rec. 1 control console SC-6/2

Electrohome EVM-23 23" black and white monitor

Canadian Listings

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