EFFECTIVENESS OF PREDICTIVE COMPUTER PROGRAMS IN THE DESIGN OF NOISE BARRIERS - A BEFORE AND AFTER APPROACH -

PART I. THE DATA ACQUISITION SYSTEM

by

J. K. Haviland Faculty Research Engineer

and

D. F. Noble Materials Research Analyst

(The opinions, findings, and conclusions expressed in this report are those of the authors and not necessarily those of the sponsoring agencies.)

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Assembly of the equipment into the noise monitoring vehicle was carried out by G. T. Gilbert, who also kept things running and solved many of the mechanical and electrical supply problems.

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ABSTRACT

A digital data acquisition system has been designed to meet the need for a long duration noise analysis capability. By sampling the DC outputs from sound level meters, it has been possible to make twenty-four hour or longer recordings, in contrast to the one-hour recordings possible on seven-inch analog tape reels.

The system is made up of a digital tape recorder, an analog-to-digital converter, an outdoor microphone unit, a weatherproofed microphone, two B & K sound level meters, and other miscellaneous equipment. It has the capability of recording and analyzing data from up to eight channels in linear or decibel format. The operation of the system in terms of its setup, calibration, and the recording of digitized signals, as well as the computer programs used to analyze the signals, are described in this report. Listings of computer programs and of a sample problem are supplied in the appendixes.

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INTRODUCTION

The purpose of this report is to describe a digital data acquisition system designed and built to measure noise levels over periods of up to twenty-four hours. The system was developed to support a study of the effectiveness of computer programs in the design of noise barriers by a before and after approach which is being carried out under highway planning and research funds administered by the Federal Highway Administration, and which is described by the working plan in reference 1.

The community selected as the site for this study is an enclave in North Springfield, Virginia, bounded by I-495, the Southern Railroad, and Heming Avenue. This neighborhood is between 2.5 and 3.0 kilometers (1-1/2 and 2 miles) west of the intersection of I-495 with I-95 at Springfield, approximately 16 kilometers (10 miles) south of Washington, D. C. The only vehicular access to the neighborhood is at the intersection of Heming Avenue and Long Pine Drive. Thus through traffic, which consisted principally of service vehicles, was held to a minimum. The research study calls for community noise surveys, both before and after the installation of barriers, to be made in such a way that the effectiveness of the barriers can be determined. This information is then to be used to evaluate the MICNOISE computer program for the prediction of noise, as well as other computer programs which may become available.

Some of the data required for the planning process and for other phases of highway work are so variable that to be presented and weighed in any logical fashion they must be put into a statistical format such as L_{10} , L_{eq} . etc. Whether data

are to be collected over relatively short periods of time or over long periods of time depends on the purpose for which they are being collected. In this case, for the purpose of characterizing community noise, it is necessary to have large quantities of data collected over periods as long as 24 hours.

The data acquisition system described here collects data in digital form. Microphone signals (often referred to as being in AC form) are first RMS averaged and weighted(i.e., converted to DC form), then they are converted to digital form, and are finally stored on magnetic tape in a form compatible with a large computer (in this case, the CYBER computer at the University of Virginia). In contrast, noise data often are collected on tape in analog form; however a great advantage of the digital form is that many hours of digital data can be collected on one tape, whereas analog recordings are severely limited in time duration. A disadvantage of the DC format, whether on analog or digital tape, is that all frequency information is lost. To rectify this, some provision has been made to obtain limited time AC recordings on analog tape. Overall, the advantages of working with the digital DC format are:

- 1. It is possible to record for long periods of time on one tape.
- 2. The data can be fed directly into a computer for analysis, thus minimizing the labor required and the potential for human error.
- 3. The circuits for digital systems can be designed by most electronics engineers using inexpensive integrated circuits. As low cost microprocessors become available, inexpensive general purpose equipment should become ever more available, making digital techniques more and more attractive.

This report covers a description of the measurement system and its operation, and also reflects initial field experience. Sample listings from an actual example are shown in Appendix A, while the computer programs for tape analysis are listed in Appendix B.

For quick reference, the reader is directed to the "OUTLINE OF PROCEDURES FOR USE OF MEASUREMENT SYSTEM".

INSTRUMENTATION

Requirements

The following instrumentation requirements were initially determined.

- 1. Simultaneous noise level measurements at a fixed location near the main highway and at a relocatable second site, so that the attenuation of sound between the highway and the site can be determined.
- 2. Ability to determine values of common sound descriptors, such as Equivalent Noise Level, L10, L50, Noise Pollution Level, Transportation Noise Index, etc., with averaging periods up to 24 hours, or for any intermediate period such as 1 hour. No requirement was set for frequency spectra.
- 3. Capacity to add channels in the future.
- 4. Ability to record nonacoustical data such as wind speed and direction and temperature.

Selection

The instrumentation finally selected is described in detail in this report as it applies to the recording of two channels of A-weighted sound levels. Its capabilities are summarized below.

> 1. The digital tape recorder, Figure 1, can sample up to eight channels of input data (in combinations, of 1, 2, 4, or 8 channels) at rates between 1 and 10 samples per second on each channel. It is capable of storing data at 5 samples per second on 2 channels for slightly less than 43 1/2 hours. Support data necessary for the computer analysis of the tape can be inserted as "headers" directly from the front console, Figure 2. Calibration signals, which also are required on the tape for the computer analysis, can be inserted through the microphones.



Figure 1. Digital tape recorder with AD converter.



Figure 2. Front console of AD converter.

- 2. The supporting computer programs are capable of determining root mean square (RMS) and cumulative percentage levels provided headers and calibration signals have been entered correctly. Also, if a decibel format is selected, the results can be expressed in terms of the standard sound descriptors. Provisions are made in the computer programs for correcting errors made when entering headers.
- Input may be any voltage to be monitored. 3. It is normally necessary to include an operational amplifier circuit to provide the correct gain and biasing. Until the present time, A-weighted RMS averaged sound levels have been obtained from the DC outputs of B & K 2204 sound level meters. This output is a negative voltage down to -1.73 volts DC and is directly proportional to the RMS level. The useable dynamic range of the 2204 is 28 dB, thus care must be taken in setting the attenuation, as is described later in this report. Eventually, the meters could be replaced by integrated circuit chips which would have greater dynamic ranges.
- 4. Input signals to the two model 2204 sound level meters have been taken, one from a B & K Type 4921 outdoor microphone unit, through twisted pair cables, and one from a weatherproofed microphone. However, any suitable available microphone systems could be substituted. The data might even be transmitted in FM form via cables or radio.
- 5. The complete system can be installed in the noise monitoring vehicle, otherwise known as the van, for easy mobility.

OUTLINE OF PROCEDURES FOR USE OF MEASURMENT SYSTEM

This report has been written as a complete documentation of the measurement system and its operation. Some of the information supplied may seem overly detailed for the requirements of the average reader, and the procedures described may seem to be

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unduly complicated. Perhaps a better understanding is gained when one realizes that a large proportion of this report is aimed at two problems:

- How to operate within the dynamic range limitations of the 2204 sound level meter; and
- 2. how to correct errors and omissions made during operation.

The procedures for the use of the measurement system are outlined in summary form below. Wherever appropriate, reference is made to the corresponding subsection heading of this report.

a. Design of Experiment. Decide on the precise objectives of the experiment and on what measurements are required. Remember that up to eight simultaneous measurements can be made, and that one magnetic tape can hold data for the following lengths of time.

Eight channels at 5 samples per second each	-	5	1/4	hours
Two channels at 5 samples per second each	-	43	1/2	hours
One channel at l sample per second	!	+35	hou	rs

It is relatively easy to change a tape, but new headers and calibration signals must be inserted, thus requiring a downtime of about 1/2 hour: for a tape change.

- b. Planning. Lay out the area in which measurements are to be made. Visit the area. Obtain permission from landowners involved. Arrange with power company for a power supply to the van.
- c. Data Transmission. Decide on methods of data transmission. If necessary, make arrangements with utility company (probably the phone company) for using poles, tying cables to utility wires, etc. Use of the cherry picker and climbing equipment may be essential.
- d. Setting Up Equipment (see Subsections Setting up the System and General Precautions). Make allowances for storm or water damage, vandalism, and interference from power lines. Minimize interference from own radio and from CB radios by grounding equipment carefully. Place connections in the twisted-pair transmission cables where one will be able to get at them. Run checks on interference with a

dummy load at the end of transmission cable. Make sure that a good clock is available so that accurate times can be noted when any unusual events occur.

e. Calibration (see Subsection Calibration). Calibration must be done with great care if dynamic range is at a premium. The problems of allowing for dynamic range may be stated as follows.

> Given a representative high level value (say L_{10}), a desired range above this to maximum output (say 6 dB), and a standard calibration tone (say 90 dB), a procedure must be set down for adjusting the gain controls to achieve the desired lower and upper limits that delineate the range.

An advantage of the 6 dB range quoted above is that the most significant digit of the light emitting diode (LED) display will just blink on at L_{10} , i.e., for 10 percent of the time. Thus a reasonably accurate check of the upper limit of the dynamic range can be made. The calibration itself is straightforward. A calibration signal must be placed on the tape for every channel of recording, and its equivalent value must be noted as the "Calibration Level". The calibration level may differ from the calibration tone if changes are in multiples of 10 dB.

- f. Loading Tapes. Care must be taken when loading tapes that they are threaded properly, and that the buffers have been dumped before a run. After a run, two end-of-file marks (Double EOF) must be recorded before the tape is removed.
- g. Running Tapes (see Subsection Recording Digital Data). Any number of runs can be placed consecutively on a tape, but the precaution of checking that enough tape is left to hold the run should be taken before starting a run. Maintain a log on the Field Data Sheet, Figure 3. Before any data run can be analyzed by computer, there must be a #2 header giving the starting time, and each channel of data must have both a calibration signal and a #1 header giving the calibration level. As long as these precede the data, they can be in any order and can even precede previous runs. Thus calibrations do not have to be repeated for each run (but, if the instrumentation has been rearranged, the gain may have been changed and may need recalibration). The computer assumes that if a given channel has been designated, then all channels with higher number designations were also calibrated; thus calibrations can be made simultaneously on all channels. The analysis program assumes that the

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most recent header or calibration signal applies. For example, the following sequence could be used for two runs in which channel 2 was recalibrated after the first run — #1 headers on channels 1 and 2, calibration signal on channels 1 and 2, #2 header, data run #1, recalibration on channel 2, #2 header, data run #2.

h. Typical Errors in Running Tapes. Since most of the errors are made during the handling of the tapes, the following list of typical errors, together with corrective actions, is supplied. Note the importance of keeping up the Field Data Sheet.

Error

Corrective Action

Known error in a header.	Note on Field Data Sheet for correction during analysis.
Omission of a header.	Note on Field Data Sheet for insertion during analysis.
Omission of a cali- bration signal.	Cannot be analyzed. Run must be repeated.
Logical error in order of headers and/or cali- bration signals.	Decide whether it can be cleared up during analysis. If so, note on Field Data Sheet. If not, repeat run.
Tape incorrectly threaded, loss of power, etc.	Assume that no usable data have been recorded and start over again with fresh tape.
Double end-of-file before end of data.	Note on Field Data Sheet for correction during analysis.
Suspected "glitch".	Place single end-of-file mark on tape and record on Field Data Sheet. The EOF will mark the point at which the "glitch" occurred for later remedial action.
Indications of radio or	Note on Field Data Sheet.

Indications of radio or Note on Field Data Sheet. other interference. Check leads, grounds, etc.

Tape Analysis (see section Use of the Computer Programs).
 Normally, the tape is first run through program SUMM (Option 1 - DISK FILE) which provides a summary listing of data, and creates a permanent copy on a disk file. If errors in

headers, etc., are found on the summary listing, or have been noted on the Field Data Sheet, program CORR is employed to create a corrected copy on a disk file. If final summaries of the corrected files are required, they can be obtained through program SUMM (Option 2 - CORRECT). Finally, program ANOISE analyzes the disk file for selected periods, and prints a listing of the results.

DESCRIPTION OF DIGITAL DATA ACQUISITION SYSTEM

General Layout

A general layout for the digital data system is shown in Figure 4 and a key to this figure is given in Table 1. The system is housed in the noise monitoring vehicle (van), which can also be equipped for air pollution analysis. The van has self-contained air conditioning and a 120-volt AC power system.

Equipment located within the van includes the master control unit incorporating the analog/digital (A/D) converter, the digital tape recorder, two B & K Type 2204 sound level meters, associated amplifiers, and power supplies. A NAGRA tape recorder is available if analog recordings should be required; and, by plugging headphones into the jack on the NAGRA, the output from the two sound level meters can be monitored by ear.

Two microphone units are available. One is a selfcontained portable outdoor unit that can be connected to the van through several thousand feet of shielded twisted-pair transmission cable. The other is a standard weatherproofed microphone connected by standard B & K microphone cable and is powered from the van. Thus, while the first microphone can be used to conduct surveys within a community, the second can be located close to a busy highway, and can be used to monitor the primary noise source for the area and thereby to estimate traffic loads.

Digital Tape Recorder

The digital tape recorder is a Digi-Data Corporation 1337-556 Incremental Tape Unit, with a 'ping-pong' buffer. Each half of the buffer has a block capacity of 400 six-bit binary words. It records on 12.7 mm (1/2-inch) seven track tape, (6-bit plus parity) using reels that will hold 365.8 m (1,200 feet) of 1.5 mil tape. Each block is stored at a density of 21.9 bits per mm (556 per inch), and there is a 19.0 mm (3/4-inch) gap between



Figure 4. Layout of digital data acquisition system.

Table l

List of Equipment and Key to Figure 4

A. Homemade box, contains

B & K 4149 12.7 m (1/2 in.) microphone UA 0381 windscreen UA 0393 rain cover (with electrostatic calibration actuator) UA 0308 dehumidifier UA 0196 extension (gooseneck) ZC 0007 input stage

- B. 12 V supply and switch for calibration of waterproofed microphone
- C. 500 Hz calibrator source
- D. UA 0029 30 m (100 ft.) cable
- E. B & K 4192 outdoor microphone unit
- F. Box with 12 V battery
- G. Belden 8760 cable , 18 AWG foil sheathed, twisted-pair, with waterproof connectors
- H. B & K 2204 sound level meters (2)
- I. 4.5 V power supply for meters
- J. NAGRA tape recorder
- K. 12 V power supply for A/D converter
- L. Digital tape recorder and A/D converter
- M. 5:1 amplifiers (2)
- N. 200 ohm active balance load
- P. 6 m (20 ft.) pole
- V. Van (noise monitoring vehicle)

blocks, so that one block takes up 37.3 mm (1.5 inches), and a total of 9,800 blocks can be stored on a single tape. There is no upper limit on recording time, since the tape is not moving while data are not being accumulated. Allowing for the fact that 160 full 12-bit words of data are stored in each block, a full tape can store data taken from two channels at five per second for slightly under 43 1/2 hours (see subheading "Elapsed Time Formulae" for more details).

Analog-to-Digital Converter

The master control unit incorporating the eight-channel converter is packaged with the tape recorder. However, the master unit is removable, and it has an independent power supply so that it can be replaced by other units. A schematic of the master unit, which was designed and built by a student research assistant (Lunglhofer), is given in Figure 5.⁽²⁾ The conversion cycle is shown in Figure 6. During a 9.216 m-sec sampling interval, digital pulses in the timer are accumulated in the 12bit counter, whose contents are in turn converted to an analog voltage in the digital-to-analog converter (DAC), and are compared with the eight input channel voltages in the voltage comparators. When any input voltage is equal to the DAC voltage (zero to 10 volts), the contents of the 12-bit counter are loaded into the corresponding memory location. During the remainder of the 100 m sec. cycle, data in the memory are available for storage in the buffer. Thus, up to ten samples per second can be taken from each of eight channels.

Switches and lights on the face of the master control panel are shown in Figure 7. Their functions are as follows, according to the numbers shown on the figure.

- 1. On-off switch with indicator light.
- Sixteen decimal bit (0-9) header selector switches. These are used to supply headers manually for recording on the tape. They do not affect the running of the tape.
- 3. Decimal rate selector switch. 'Legal' settings are 1, 2, 5, 0 for 1, 2, 5, 10 samples per second when channel mode switch (#6) setting is 9. For other mode switch settings, the rate is always 10 samples per second.
- 4. Decimal channel selector switch. 'Legal' settings are 1, 2, 4, 8, corresponding to the number of channels which are read onto the tape. Other channel switch settings lead to irregular block lengths which cannot be analyzed by the computer program.





Figure 5. Schematic of analog-to-digital converter.









- 5. On-off switch for indicator lights (#8).
- Decimal 'mode' switch (0-9). Note that, not only is this recorded on the tape, but that it also affects the operations of the recorder.

Setting 0 — The contents of the 16-decimal bit selector switches (the header) are loaded into sixteen 6-bit binary words in the buffer. The contents of the mode switch are loaded as the 17th word. This is repeated 20 times, until the buffer contains 340 6-bit words.

Setting 1-9 - The contents of 1 to 8 of the 12-bit words in the memory are loaded as 16 6-bit words in the buffer, according to the setting of the decimal bit 'channel' selector switch (#4). When this is less than 8, i.e., 1, 2, or 4, then each channel is repeated 8, 4, or 2 times, respectively. The contents of the mode switch are loaded as the 17th word. The 17-word groups are loaded 20 times, until the buffer contains a block of 340 words. Note that with the channel selector switch (#4) set to 2 there would be a total of 80 consecutive readings from each of channels 1 and 2 in a block.

- Decimal bit 'display' switch. Settings 1-8 of this switch select the channels to be displayed on the 12-bit LED display (#8).
- 8. Twelve-bit LED display. This displays the contents of the channel indicated by the display switch. For a mode switch (#6) setting of 0, it gives the settings of the corresponding pair of header selector switches (i.e., 1 and 2, 3 and 4, 5 and 6, etc.), while for a mode switch setting of 1-9, it gives the contents of the corresponding channel in memory. The LED display is turned on or off by the toggle switch (#5).
- 9. Coaxial inputs for the eight channels.

- 10. Stop button and light. When the button is pressed, the red indicator light comes on and stays on until the buffer has completed loading and has dumped onto the tape.
- 11. Start button and light. When the button is pressed, the green indicator light comes on and stays on until the tape recorder stops recording. For mode switch (#6) settings of 0 to 8, intended for calibration recordings, only one buffer load is dumped onto tape, but for a mode switch setting of 9, the tape recorder continues to read until the stop button (#10) has been pressed.

Outdoor Microphone Unit

A standard B & K Type 4921 outdoor microphone unit supplies the signal for one of the recorded channels. This unit consists of a Type 4149, 12.7 mm (1/2 in.), quartz-coated condenser microphone, with rain cover, calibration actuator, windscreen, dehumidifier, and preamplifier. The unit is attached to a box containing a 12-volt battery which supplies all of the power requirements. It is mounted so that the microphone is 1.5 m (5 ft.) above ground.

Additional features include a heater; a signal generator supplying 215 volts at 500 Hz to the electrostatic actuator in the rain cover, which results in a 90 dB calibration signal at 1,000 Hz; the option of linear or A-weighting; and an amplifier with gain adjustable up to 60 dB and with an optional 50- or 200-ohm transformer output.

The amplified output is fed into up to 1,500 m (5,000 ft.) of 18-AWG foil-shielded twisted-pair cable having a resistance of 89 ohms/m (27 ohms/ft.). The cable is terminated by a balanced 200-ohm load and by an operational amplifier whose output is fed directly into a Type 2204 sound level meter. Lengths of twisted-pair cable are joined by waterproof connectors arranged to permit the unit to be hooked up at prearranged locations. The twisted-pair cable can be strung along utility lines without danger of picking up interference. Due to capacitance effects of this type of cable, there is a small attenuation at frequencies above 5 kHz.

Weatherproofed Microphone

The weatherproofed microphone is a homemade unit consisting of a Type 4149 microphone, as in the outdoor unit, with dehumidifier, rain cover, and windscreen. This attaches to a gooseneck and thence through the input stage to one or more 30 m (100-ft.)extension cables which feed directly into a Type 2204 sound level meter.

The microphone is installed in a box shaped to simulate a B & K sound level meter. A separate box contains a 215-volt, 500-Hz signal generator supplying the electrostatic actuator in the rain cover. Twelve volt power for the signal generator is supplied through cables from the van.

The microphone and box are attached to the top and bottom, respectively, of a 6 m (20-ft.) pole, and are intended for installation near the highway. Once the proper relationship has been established between traffic levels and noise level readings, this unit can be used to collect baseline data for the evaluation of noise levels obtained at different locations with the outdoor microphone unit.

Miscellaneous Equipment

Other equipment located in the van consists of batteryreplacing power supplies for the two Type 2204 sound level meters, a pair of amplifiers to invert the negative DC output of the meters and to amplify it five-to-one, a 12-volt power supply for the calibration signal generator in the weatherproofed microphone, and a two-channel NAGRA tape recorder with headphone both to make AC recordings and to monitor the two microphones aurally. There is a self-contained 115/230volt AC power supply in the van, but because of the noise created by the gasoline engine, provisions were made for an external hookup to a power supply as an alternative. One of a pair of 43-MHz band radios is located in the van and the other in a car for communication with the outdoor microphone site.

OPERATION OF DIGITAL DATA ACQUISITION SYSTEM

The digital data acquisition system has a broad capability for the storage of up to eight channels of data. The following description is narrowed to an application to two channels of noise data and to processing on the ANOISE computer program. Further, it is assumed that the weatherproofed microphone will be installed near the highway, and that the outdoor microphone unit will be used at various locations throughout the community.

Setting Up The System

The basic setup follows the diagram in Figure 1, and is reasonably straightforward. However, the following comments are made as a result of experience gained with the system.

- Because the generator system in the van is noisy, it is advisable to arrange for an external power supply. This can be made available through the local power company in a built-up neighborhood.
- 2. Provided that permission has been obtained from the telephone company, the twistedpair cable can be attached to the telephone line with plastic ties, using a cherry picker vehicle. Waterproof connectors should be installed at all points where the outdoor microphone is to be placed; for convenience, these would normally coincide with telephone poles. To avoid vandalism, it is probably better to climb the telephone poles to connect the microphone rather than to leave connectors hanging from the poles.
- 3. Since the weatherproofed microphone should eventually be located directly above the barrier to minimize interference reflected from the barrier surfaces, it should be placed in the same location before the barrier is installed by mounting it on a pole.
- 4. Note that calibrations and recordings are made with both sound level meters set to SLOW/A, and with the outdoor microphone set to LINEAR at a gain of up to 50 dB.

Calibration

Calibration would be a simple operation if it were not for the limited dynamic range of the B & K Type 2204 sound level meter, whose characteristics are shown in Figure 8 in the form of output versus input expressed in decibels. Since the AC input to the meter is first passed through the calibration adjustment and then through the input and output attenuators, the overall gain is arbitary. In Figure 8 the overall gain is set at zero and both input and output are related





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Input/output relationship for B&K 2204 meter.

Figure 8.

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to the meter scale. The actual output is a DC voltage, proportional to RMS pressure, with ranges from -.032 to -1.73 volts. These voltage values are given on the right-hand side of Figure 8.

The input/output relationship depends on the crest factor of the input, the crest factor being the ratio of peak to RMS value, expressed in decibels. Thus, if the input was a square wave, the crest factor would be zero dB; and when the amplifiers overloaded, the output versus input relationship should ideally follow the solid line shown in Figure 8.

Data shown in the broken line were obtained with a sinusoidal input having a crest factor of 3. However, because a feedback type of RMS detector is used in the B & K 2204 meter, only 1.5 dB are lost from the full dynamic range potential of the instrument at the upper end.

The crest factor from traffic noise will be higher than this. Lacking more precise information, a target L_{10} of 12.5 dB was selected. As will be seen from Figure 8, the margin range of the A-D converter is just under 6 dB, while the useable range for a new dB crest factor would be from 4.4 dB above target L_{10} to 30.2 dB below. To set the system up, the operator selects the target L_{10} , then adjusts the meter calibration for a 12.5 dB output (-1.04 volts output, which is off the scale of the meter).

The adjustment is made during the calibration procedure. Steps (a) to (e) are required only if the rain cover and actuator have been removed from the microphone and replaced without recalibrating the system.

- a. Remove rain cover and actuator from microphone and install regular grid.
- b. Set meter to "SLOW/A".
- c. Calibrate meter with calibrator or piston phone.
- d. Replace rain cover and actuator. Be careful to screw the cover down tightly.
- e. Energize the actuator and determine the calibration tone. If the tone is lower than the standard value (90 dB), first check the leads, then tighten the rain cover until the 90 dB value is obtained.

- f. Subtract target L_{10} from calibration tone and add 12.5 dB.
- g. Express result of (f) as lON + LSET (setting value).
- h. Energize the actuator and turn adjustment screw until meter dial reads the setting value (LSET). The attenuator setting may need to be changed to bring LSET within the range of the adjustment screw.
- i. Make calibration recording.
- j. Subtract 10N from the calibration tone to obtain the calibration level (LCAL).
- k. Subtract 10N from the attenuator setting and change the setting accordingly for recording. An input equal to target L_{10} will now drive the output to 12.5 dB, so that the needle will hit the upper stops on the dial.
- 1. Record data. Note that the most lefthand light of the 12-bit LED display will just come on at target L_{10} .

Example #1. Target $L_{10} = 75 \text{ dB}$.

Calibration tone = 90 dB. f. 90 - 75 + 12.5 = 27.5 dB. g. N = 2; LSET (setting value) = 7.5 dB. h. Meter reads 87.5 dB after adjustment. i. Calibration tone is recorded at 87.5 dB. j. Calibration level (LCAL) = 90 - 20 = 70 dB. k. Attenuator setting for recording (ATT) = 8 - 20 = 60 dB.Example #2. (Typical for incorrectly adjusted electrostatic actuator.) Target L₁₀ = 70 dB. Calibration tone = 87 dB.

87 - 70 + 12.5 dB = 29.5 dB. f. N = 2, LSET = 9.5 dB. g. Meter reads 89.5 (CALSET) after adjustment. h. Calibration recorded at 89.5 dB. i. LCAL = 87 - 20 = 67 dB.j. k. ATT = $80 - 20 = 60 \, \text{dB}$. Example #3. (Typical of outdoor microphone with 40 dB gain.) Target $L_{10} = 60$. Calibration tone = 90. 90 - 60 + 12.5 = 42.5. f. N = 4, LSET = 2.5 dB. g. Meter reads 122.5 (CALSET) after adjustment. h. i. Calibration recorded at 122.5 dB. j. LCAL = 90 - 40 = 50 dB. k. ATT = 120 - 40 = 80 dB.

General Precautions

Assuming that the system has been set up according to the general layout shown in Figure 4, and that each channel has been, or will be, calibrated according to the instructions in the preceding section, the following precautions should be taken before and during recording.

> Check for interference picked up by the twisted-pair cable by replacing the microphone with a 200 ohm resistance and reading the sound level on the meter. The equivalent background level due to interference is then given by

> > Equivalent interference level = meter reading + calibration tone - calibration recording level.

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- Example: Continuing example #3 of preceding paragraph, assume a meter reading of 56 dB during the interference check. Then the equivalent interference level = 56 + 90 - 122.5 = 23.5 dB, which is below the background level of the 12.7 mm (1/2 in.) microphones used.
 - 2. Check for interference from radios used for site to van communication. If this interference is unacceptable, maintain radio silence during runs.
 - 3. If radio silence is maintained, arrange for an alternative communication link with the outdoor microphone site so that the calibrator can be turned on and off as required. (If an extra twoconductor cable is strung, the calibrator can be operated from the van.)
 - 4. Before starting the recording, watch the 12-bit LED display for signs of overloading. The most left-hand light should flash about 10 percent of the time if the L_{10} level has been predicted accurately and the equipment has been set up properly.
 - 5. If an analog recording is to be made on the NAGRA, check that a tape is loaded, that it is set up for a run, that the proper calibration recordings have been made, and that the appropriate gains have been set to make the recordings. The dynamic range of the NAGRA is sufficiently large that the precise adjustments needed for the sound level meters are not needed for the NAGRA recorder.
 - Make sure that an accurate clock will be available throughout the recording.
 - 7. Make sure that enough digital tape is available to complete the run to be started. A full tape contains 9,800 blocks, which will provide about 42 hours of recording on two channels at a rate of five per second, allowing for headers and calibration data. If a new tape has to be loaded (a) place a double EOF on the old tape before rewinding; (b) thread the new tape carefully, according to the diagram in the recorder; and (c) before advancing the new tape to the initial write position, press the start button to unload the buffer.

 Determine the correct channel and rate settings, and encode them into the master controller (items #3 and #4 in Figure 7).

Recording Digital Data

The following steps should be followed for recording digital data. The procedure is repeated for each recording until a new tape is required. Note that both 2204 meters remain on the SLOW/A setting, and that the 4921 outdoor microphone is set on LINEAR.

- 1. Enter #1 headers for each channel used, according to Table 2, and press the start button (Figure 7, #11) once. Before attempting to enter additional information, wait for the tape to move and for the green light to go out, which indicates that the header information has been transferred to the tape and that the system is ready to accept additional information.
- Assuming that the proper calibration adjustments have been made, record calibration signals by the following procedure:
 - (a) Set the mode switch (Figure 7, #6)
 to 1 for channel #1.
 - (b) Energize the calibration actuators.
 - (c) Press the start button. If traffic noise is being picked up over the calibration signal, as indicated by flashing of the left-hand lights in the LED display, hold the button down for at least one minute to minimize the statistical effect of intruding noise.
 - (d) Note that a calibration recording has been picked up on all channels used, as indicated by the channel switch (Figure 7, item 4). If an incorrect calibration has been supplied on a higher channel than was indicated by the mode switch in (a) above, reset the mode switch to the higher value and repeat the procedure, this time using the appropriate calibration signal. If necessary, repeat this

Table 2

No. 1 Header

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Header Selection Switch No.	Setting							
(Figure 7, item #2, decimal bit display switch)								
#1	1							
#2	Channel # (1-8)							
#3-5	Site #							
#6 - 8	Location # of outdoor microphone							
#9	1*							
#10-14	Calibration level (to 2 decimal places)							
#15	Sample rate (1, 2, 5, 0 = 10)							
#16	Channels (1, 2, 4, 8)							
Mode switch (Figure 7, #6)	0							

*Use 1 for decibel format, the computer programs will also accept 0 for linear format.

for an even higher channel, until the correct calibration signals have been supplied on all channels. Note the ascending order of channel numbers, which must be followed to conform to the logic of the ANOISE computer program. The mode switch does not set channels, it only provides data to the ANOISE computer program by which it can be determined, through programmed logic, which calibration signal is to be used.

- (e) Remember to make calibration recordings on the NAGRA recorder, if required.
- 3. When all calibrations have been made, enter a #2 header according to Table 3, and press the start button once.
- 4. Turn the mode switch to "9", set the attenuators on the sound level meters to the recording position (ATT) and check the LED display. If all is ready, press the start button when the time indicated in the #2 header is reached.
- 5. To stop recording, press the stop button, then wait for the tape to move once more for the red light to go out before changing settings or opening the door of the recorder. An EOF may be placed on the tape at this time as a marker, but is not essential.
- 6. If further recordings are to be made, leave the tape recorder switched on; if the tape is to be removed, place a double EOF on the tape, and then rewind.
- 7. Note the hierarchy of input data required by the ANOISE program to analyze the tape. The basic rules are as follows:
 - 1. The most recent input applicable to a given channel is used.
 - 2. Data (that is, Mode 9) cannot be analyzed unless both a type 1 header and a calibration signal have been supplied for each channel, and a type 2 header has also been supplied. These can be in any order.
Table 3

No. 2 Header

Header Selection Switch No.	Setting
(Figure 7, #2)	
#1	2
#2-3	Month
#4 - 5	Day
#6 - 9	Time at start
	of recording in
	24-hour code
#10-13	Project No.
#14 - 16	Job No.
Mode Switch	0
(Fig. 7, #6)	

- 3. The start time is taken from the most recent type 2 header.
- 4. So far as the system is concerned, there is no need for recalibration before each run. However, if the outdoor microphone is moved to a new position, changes of attenuation in the cable may necessitate recalibration. In such cases, recalibrations can be made on channel #2, using mode switch #2 settings, without repeating the type 1 headers.

USE OF THE COMPUTER PROGRAMS

There are three computer programs; namely, SUMM, CORR, and ANOISE. The SUMM program comes in two options: option 1 (DISKFILE) loads the system tapes onto disk files and provides a summary listing; option 2 (CORRECT) provides a summary listing of data on a disk file. The CORR program provides for the correction of headers, while ANOISE performs the analysis of the digital data. Input stacks for all four variants of these programs are shown in Figure 9. These describe the handling of the digital data acquisition system tapes and the creation of disk files. For retention periods over about two weeks, it is advisable to transfer the data from disk files to permanent tapes. Procedures for doing this are not described here, but are described in the NOS/BE7 Manual.⁽³⁾

Program SUMM, Option 1 (DISKFILE)

Option 1 of the SUMM program performs the following functions.

- Reads a digital data acquisition system tape and transcribes it onto a disk file. Up to N records, separated by double EOF's, are handled, where N is supplied by the user (N has a default value of unity).
- 2. Provides a summary listing.
- Replaces all oversize (excess data) blocks or blocks with parity errors by null blocks, and assigns to them a mode number of 10.
- 4. Replaces single EOF's with null blocks, and assigns to them a mode number of 11.

		Figure 9. Input stacks fo computer progra	
 * * * COMPATIBLE WITH SCUPE 3.4 ON CDC 6400 AND NOS/BE1 ON CYBER 172 * * * CARDS PRECEDED BY ASTERISKS DENOTE HEADERS OR COMMENTS ONLY * * * INSTRUCTIONS FOR SUMMARY (OPTION 1) FOLLOW. 	<pre> * * * JOB CARD FULLOWS. TILE IS SIX ALPHAS, BBBBBB IS ACCOUNT #. * * * YOUR NAME IS SUITABLE IDENTIFICATION. TILLE:JBBBBBB:I500.MT1.YOUR NAME * * * YOUR NAME * * * * NOT WHITEN BY SYSTEM. * * * * * * * * * * * * * * * * *</pre>	 * * * * I.E., TOTAL NUMBER OF DOUBLE EOF**S ON TAPE (DEFAULT N=1). DISKFILE N * * * INSERT BLUE CARD * * * INSERT BLUE CARD * * * ENDS SUMMARY (OPTION 1) PROGRAM INSTRUCTIONS. * * * INSTRUCTIONS FOR SUMMARY (OPTION 2). * * * JOB CARD FOLLOWS. NOTE THAT MT1 IS NOT REQUIRED UNLESS YOU ARE * * * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. TITLE.BBBBBBB.T500. YOUR NAME * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * * CONTROL CARDS FOLLOW. GGGGGG IS CORRECTED PERMAMENT FILE NAME. * * * * * * * * * * * * * * * * * * *	 LGO. NISERT ORANGE CARD. NISERT FORTRAN DECK FOR SUMMARY PROGRAM. NISERT FORTRAN DECK FOR SUMMARY PROGRAM. NISERT ORANGE CARD. NITLE CARD FOLLOWS. AA IS ANY B0 COL. HEADER. USE BLANK CAHD N N N ITTLE CARD FOLLOWS. AA IS ANY B0 COL. HEADER. USE BLANK CAHD N N N N AAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

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INSTRUCTIONS FOR CORRECTION PROGRAM FOLLOW. ⊅ * ₽

JOB CARD FOLLOWS. \$ ₽ ⇒ ⊅

IIILE, BHBBBB, ISO0. YOUR NAME

FFFFFFF, GGGGGGG ARE PERMANENT FILE NAMES. CONTROL CARDS FOLLOW. \$ \$ • ≄

DD IS RETENTION PERIOD IN DAYS. ATTACH (TAPE7, FFFFFF) \$ ¢ ¢ \$

HEQUEST (TAPE8, "PF)

F1LE(TAPE7,RT=F,BT=K,FL=340,MBL=340,RB=1,CM=N0) FILE(1APE8,RT=F,BT=K,FL=340,MBL=340,RB=1,CM=N0) E IN(L=0)

LUSET (FILES=TAPE7)

LUSET (FILES=TAPE8) L60. CATAL 06 (TAPE8, 6666666, RP = DD)

INSERT ORANGE CARD. ≄

INSERT FORTRAN DECK FOR CORRECTION PROGRAM.

INSERT ORANGE CARD. ≎

AA... IS ANY 80 COL. HEADER. USE BLANK CARD IF THERE IS NO TITLE. TITLE CARD FOLLOWS. 4 ¢ ٥ ۵ ψ

AAAAAAAAAAAAA

\$ 9 ¢

COMMAND CARDS FOLLOW. HEADER CARD INSERTS HEADER. DELETE REMOVES BLOCK. BRBBB=BLOCK NO., COLS. 16-20, RIGHT JUSTIFIED. BLOCKS MUST BE IN ASCENDING ORDER. 4

¢ \$

¢ ¢

COLS. 31-47 нниннинининим IS 16 01611 неарев Plus MODE NO. **МИНИМИРИНИИНИНИИ** 88888 **BBBBB** HEADER **UELETE**

\$ ₽

INSERT BLUE CARD. ENDS CORRECTION PROGRAM INSTRUCTIONS. * *

INSTRUCTIONS FOR ANOISE PROGRAM FOLLOW # 3

JOB CARD FOLLOWS. ₽ ¢ φ \$

IIILE, BBBBBB, I500. YOUR NAME

GGGGGGG IS CORRECTED PERMANENT FILE NAME. CONTROL CARDS FOLLOW. ₽ \$ 3 \$

DD IS RETENTION PERIOD IN DAYS \$ 4 ¢ \$

ATTACH(TAPE1,6666666) FIN(L=0)

FILE(IAPE1,RT=F,BT=K,FL=17,MBL=340,RB=20,CM=N0)

LUSET (FILES=TAPE1) L60.

INSERT ORANGE CARD.

INSERT FORTRAN DECK FOR ANOISE PROGRAM.

INSERT ORANGE CARD.

4

AA... IS ANY BU COL. HEADER. USE BLANK CARD IIILE CARD FOLLOWS. 4 \$ ¢

IF THERE IS NO TITLE.

AAA AAAAAA \$

DATA INPUT FOR ANDISE FOLLOWS. IDENTIFIER: AA=MONTH, BB=DAY, CC=HOUR, DD=MINUTES. \$

START ANALYSIS AT: EE=HOUR, FF=MINUTES. END AT: 66=HOUR, HH=MINS.

SUMMARY PERIOD LENGIH: ZZ=HOURS, JJ≈MINUTES. Laa to LHH ARE SELECTED PERCENTAGES FOR CALIBRATION ON

CHANNELS 1 TO B. LAA STARTS IN COL. 32, LBB IN COL. 37, ETC. ٦

DEFAULT VALUE IS L50. ₽

¢

LEE LFF CARDS MUST BE IN SAME ORDER AS DATA ON TAPE. :FF-66:HHXZZ:JJ LAA LBB LCC LDD LEE LFF CC:DDAA/BB

Г66 LHH

INSERT BLUE CARD. ≠ ¢ \$ ÷ \$

ENDS ANDISE PROGRAM INSTRUCTIONS.

The summary listing contains the following information (See Appendix A for a sample).

- All header lines once, both in numeral and interpreted form (headers are repeated 20 times in each block on the tapes).
- 2. An indication that data of a given mode (1 through 11) are starting.
- 3. Wherever: a mode number changes, a summary of blocks together with the elapsed time.
- 4. An indication when an EOF is encountered, and that it has been replaced by a dummy block on the disk file.
- 5. An indication when an oversize block or a parity error is encountered. The block in question is printed out.
- 6. An indication when a double EOF is encountered. Since a total of N records are summarized, there will be N double EOF's in a summary listing; however, these will be replaced by single dummy blocks on the disk file.
- A final summary of the number of blocks in each mode. Note that data are always given in blocks.
- 8. The block number is listed for each line of the above summary for identification.

Program SUMM, Option 2 (CORRECT)

Option 2 of the SUMM program provides a summary listing of a disk file or of a permanent tape. It is intended for use on a corrected record, after the program CORRECT has been used.

The summary listing for the CORRECT option follows the same format as for the disk file option; however, it must be recalled that the CORRECT option does not include creation of a new disk file. Therefore, no new dummy blocks are created.

Program CORRECT

The CORRECT program transcribes a disk file and inserts user supplied corrections, which may be in one of two forms (see Figure 9).

- 1. "HEADER" This inserts a given header in a block specified by the user.
- 2. "DELETE" This deletes a block specified by the user, replacing it with a dummy block.

Program ANOISE

The ANOISE program performs an analysis of the data on a disk file or permanent tape. It can be either in decibel or in linear format, according to bit nine (#9) of the #1 header supplied with the data. The user specifies the following (see Figure 9).

- Month, Day, Hour, and Minutes at which the data record starts. These must coincide with a type 2 header (Table 3), and is required for identification.
- 2. Hours and Minutes at which analysis is to start.
- 3. Hours and Minutes at which analysis is to end.
- 4. Analysis period in Hours, Minutes. (When there are several periods, they must be in chronological order, without overlap. There is no provision in the program for tape rewind.)
- The following output data are supplied by the program.
- 1. A listing of various calibration parameters for each channel.
- 2. Uncorrected (i.e. precalibration) statistical levels for the calibration recordings.
- 3. Calibrated statistical levels, plus Leq and Leps, for each channel averaged over each analysis period. Also, LSIG, NPL, and TNI for each channel for which decibel format was selected on the #1 header.

Definitions of the various terms appearing in the output are given in the next section, ANALYTICAL RESULTS. A sample of the output, with a key to its interpretation, is given in Appendix A.

ANALYTICAL RESULTS

The ANOISE computer program can present results in either linear form ('0' on #9 switch)(Figure 7, number 2) or decibel form ('1' on #9 switch). In either case, standard acoustical symbols are used in the headings (L_{eq} , L_{50} , etc.).

Elapsed Time Formulae

Data are stored on the tape in 340-word blocks, with each block containing twenty 17-word records. Two 6-bit words are required for each 12-bit data point, so that a record contains 8 data points and a mode switch setting. If all eight channels are being recorded (Figure 7, item 4=8), each channel is read once per record. However, the range of switch settings 1, 2, 4, 8 corresponds to 8, 4, 2, 1 readings per record from each channel, respectively. Channels are read 10 times per second in the header and calibration modes (mode switch settings 0-8), but the rate is controlled at 1, 2, 5, or 10 (Figure 7 rate switch item 3 = 1, 2, 5, 0, respectively) with the mode switch set to 9. Thus, given the mode switch, channel switch, and rate switch settings, the elapsed time can be found by counting records or blocks as follows.

- = <u>16 x Block Count</u> Secs Channels
- Elapsed Time (Mode = 9) = 8 x Record Count Secs Rate x Channels
 - = <u>160 x Block Count</u> Secs Rate x Channels

Raw Data Definitions

Symbols in parentheses are as in the ANOISE program output; note that standard acoustical symbols are used for linear output.

> Let x_{ij} = ith reading on jth channel; i = lN; j = lChannel Switch setting; and N = 8 x Record Count/Channels.

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$$x_{RMSj} - \sqrt{\frac{1}{N} \sum_{i=1}^{N} x_{ij}^{2}} = RMS \text{ value}$$

$$\epsilon_{j}(=LEPS) - \sqrt{\frac{1}{Nx^{4}} \sum_{RMSj}^{N} \sum_{i=1}^{N} x_{ij}^{4}} - 1$$

= Coefficient of RMS variance for readings on channel j.

E_j (= UNCORRECTED L VALUE) = The value for x on channel j which is exceeded E% of the time.

Linear Data Definitions

- $(x_{ej})_{c}$ (= LE REFERENCE) = Value of x_{EJ} obtained from last calibration signal, based on a value which was exceeded e% of the time, where e either had the value of 50 or was selected according to the nature of the calibration signal.

Then

- L_{eqj} (= LEQ) = $x_{RMSj} \times x_{CALj}/(x_{ej})_c$ = Calibrated rms level on channel j (the units are the same as for the calibration level); and
- L_{Ej} (= L99 to L1) = $x_{Ej} \times x_{CALj}/(x_{ej})_c$ = Calibrated level on channel j which is exceeded E% of the time.

Decibel Format Data Definitions

- L_{CALj} (= CALIBRATION LEVEL) = Calibration level for channel j expressed in decibels.
- (L_{ej})_c (= LE REFERENCE) = 20 log₁₀ (x_{ej})_c = Uncorrected level, based on e%, obtained from last calibration.
- L_{eqj} (= LEQ) = 20 $\log_{10} (x_{RMS})_j + L_{CALj} (L_{ej})_c =$ "Equivalent Level".
- L_{Ej} (= Ll to L99) = 20 $\log_{10} x_{Ej} + L_{CALj} (L_{ej})_{c}$ = Calibrated level on channel j which is exceeded E% of the time.
- LEPSj (= LEPS) = 20 $\log_{10} (1 + \epsilon_j) \approx 8.686 \epsilon_j$ = Standard deviation expressed in decibels, based on readings on channel j.

$$L_{SIGj}$$
 (= LSIG) = (L_{10j} - L_{50j})/l.28
= Standard deviation expressed in decibels,
based on assuming that L_E is derived from
a normal distribution.

NPLj (= NPL) = L_{eqj} + 2.56 L_{SIGj} = Noise Pollution Level, a noise descriptor developed by Robinson (reference 4).

TNI_j (=TNI) = 4 (
$$L_{10j} - L_{90j}$$
) + $L_{90j} - 30$
= Transportation Noise Index.

CONCLUSIONS

As a result of limited experience in the field with the measurement system, the following conclusions have been reached.

- 1. The digital sampling feature of the system makes it possible to collect data for well over 24 hours, in contrast to the 30-minute to 2-hour recording times of analog equipment.
- 2. In digital form, the data tapes can be analyzed quickly on the computer, in contrast with the many hours which must be spent in the laboratory with analog data.
- 3. The loss of frequency information with digital recording could be disadvantageous, and certainly means that analog recording must also be available if spectral data are required.
- 4. Although some troubles were experienced with the equipment during its first introduction in the field, particularly from radio interference, it is believed that these have been cleared up by minor redesign, including the elimination of ground loops.
- 5. Although the cost of making the first set of measurements was much higher than previously experienced, this was evidently due to the fact that the measurements were much more ambitious than previously attempted. For example, direct labor costs relate to time in the field, so that the 160 hours of recordings made were inevitably costly in comparison with the series of 15-minute measurements made earlier. Also, the desire to obtain measurements from throughout a neighborhood, and in some cases as much as 2,000 m (6,000 ft.) away, led to the use of a cherry picker for attaching the cables, which is expensive when compared with laying up to 120 m (400 ft.) of cable across fields.

RECOMMENDATIONS

The following recommendations are made.

- 1. The digital measurement system should be used whenever possible. Exceptions would be occasions where spectral components are required, where very short recordings are satisfactory, or where recordings must be made with little or no notice. In most of these cases, considerable work will be necessary in the laboratory on the analog tapes made. When appropriate, the digital measurement system can still be used in laboratory analyses.
- 2. A second outdoor microphone system is desirable and should be obtained whenever practical.
- Consideration should be given to updating the system as follows:
 - (i) Replace the B & K 2204 meters with RMSdetecting integrated circuits.
 - (ii) Replace the twisted-pair cable systems with an FM system.
 - (iii) Replace the single all weather microphone with a pole capable of holding several microphones at different heights.

REFERENCES

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- 3. NOS/BE1 Reference Manual, Control Data Corporation, Arden Hills, Minn., Publication No. 6049380, 1975.
- 4. Robinson, D. W., "The Concept of Noise Pollution Level", <u>NPL Aero - Report A. C. 38</u>, National Physical Laboratory, England, March 1969.

APPENDIX A

SAMPLE ANALYSIS

The purpose of this Appendix is to illustrate the recording and analysis of data with an actual example, using the original system tape No. VHRCO1, which contains almost every type of error conceivable. First it is placed on permanent file as No. EXNOYO1 and summarized. Then a corrected file, EXNOYO1A, is created and summarized. Finally, the data on the corrected file are analyzed. The reader should refer to Figure 9 for details of the input stacks and for card formats.

Field Data Sheet

The sample field data sheet is shown in Figure A-1. Initially, a 24-hour run was started at 1500 hours on May 19; however, this was stopped at 1843 hours, and a fresh 24-hour run was started at 2220. During this run, the attenuator setting on #2 channel was changed at about 0520 hours on the morning of May 20. This is definitely not a recommended procedure, but would have been better if an EOF had been recorded. The proper procedure would be to insert a new header.

The 17 columns on the data sheet are for recording the 16 header selection switch settings (Figure 7, item 2) and for the mode switch setting (item 6). Note that for this example each header is recorded on the sheet with both runs having two #1 headers, one each for the two channels, and one #2 header, which gives the starting time. In between these, there is a calibration recording on mode 1 (the mode switch, item 6 of Figure 7, is set to 1) for each run, meaning that the calibration tones are to be on and used for <u>both</u> channels. Also, note that both runs were made on mode 9.

The four partial columns on the extreme right record the calibration tone; first, the target L_{10} value assumed in setting up the runs, then the actual calibration recordings as read on the 2204 dials, and finally the 2204 attenuator switch settings. Levels for the #2 channel are high because of the amplifier settings in the outdoor microphone unit.

Table A-1 is supplied to help the reader check the calibration procedure used. Reference should be made to the section in the main text under the heading Calibration for details of the analysis.

FIELD DATA SHI	3ET									,	Loci	J.			9							
	-			Tob.	Ę	,					Stal	rt		05/	19:1(500					.ä. (13 M
Tape No. VIIKUU		Upera	aror red	May					ينيوسين. ا		Duri				2400							4.5
) :							מזק י						╢═╸					
CALIBRA'TION	1	; #	N N	itte mber		Sé Loc	ensor atio	L	J=L l=dB	Cal.	Levé Levé	а. ХХ. XX			Ratec	lhs	0	Ι	EMARKS (ЛR		ык
			ſ		at S'	PART												CALJ	BRATION	DATA		R
MAIN HEADER	2	LNOW	H	DA	ĸ	ноин	~	MINU	ΓE	Pr	oject	No.		JL.	DD NC		0					0
CHANNEL NO.			7				4		ι Ω		9		6		ω			Cal.	Target	Setting	Atten.	×
SWITCH NO.	Ţ	2		4	5	9	7	в	6	10	П	12	13	4	5	161	Ψ	Tone	L10	CALSET	ATT	
#1 Hdr.			0	0	1	2	0	6	Ч	0	7		0	0	ى ك	2	0	94	83	83•5	60	
#1 Hrd.	-1	2	0	0	Ч	2	0	9		0	5	0	0	0	 ک	2	0	60	63	123•5	80	
Calib.	\triangle	\bigvee	\bigwedge	\bigvee																		
#2 Hrd.	2	0	5		6		5	0	0			8	ε	6	0	8	0					
Run	\bigwedge	\bigvee	\wedge	\bigvee													<u></u> б	5 hr.,	43 min.	nun		
DEOF	-																	Requ	ires Cor	rection		×
#1 Hdr.			0	0	+-	5	0	9		0	7		0	0	5	2	0	1 6	84	82.5	60	
#1 Hdr.	1	2	0	0	Г	2	0	9		0	£	0	0	0	ى ك	2		06	63	129.5	80/90*	
Calib.	\bigwedge	\bigvee	\bigwedge	\bigvee					· .								 					
#2 Hdr.	2	0	5	Ч	6	2	2	2	0		1	8	Ω.	6	0	8	0		-			
Run	\wedge	\bigtriangledown	\wedge	\bigvee													<u>Б</u>	23 hr.	, 59 min	run j		
DEOF																		Tape R	emoved			
																	*******		-			
																		*Attenu	ator set	ting chan	nged at	
																		0520 h	ours.			

Table A-1

Summary of Calibration and Dynamic Range Calculations

	Run of Ma	y 19; 1500	Run of May	19; 2220
Quantity	Channel #1	Channel #2	Channel #1	Channel #2
Target L ₁₀	83	63	84	63
Cal. Tone	94	90	94	90
Step f	23.5	43.5*	22.5	39.5
Step g	20	40*	20	30
LSET =	3.5	3.5*	2.5	9.5
Steps h,i; CALSET =	83.5	123.5*	82.5	129.5
Step j; LCAL =	74	50	74	50**/60
Step k; ATT =	60	80	60	80**/90

* These figures were computed in error as though the calibration tone had been 94 dB. Thus 4 dB were lost in the upper dynamic range. Otherwise, calibration is correct.

Channel #1 had to be calibrated with a 94 dB hand-held calibrator because of a malfunction in the electrostatic calibration circuit. During calibration, the attenuator dials were at 80 dB, but were switched back to 60 dB during data recording so that the calibration level was equivalent to 74 dB, as shown in the #1 header. This is the only information required by the program; information on L_{10} and on the calibration recordings is relevant only for determining the dynamic range.

An accidental double end-of-file (Double EOF) is noted after the first run. Later, a correction must be applied the double EOF, otherwise the computer will take it as the end of the tape. A single EOF could have been placed here, but is not required.

^{**} The original attenuator setting of 50 dB was too low, so that 10 dB were lost in the upper dynamic range. It was changed during the run.

First Summary Listing

The input stack for SUMM (Option 1, DISK FILE) is shown in Figure A-2, while a complete listing of program SUMM is given in Appendix B. Note that the tape VHRCO1 is supplied, and that a disk file EXNOYO1 is created with a 30-day retention period.

Note that the second input data card reads "DISK FILE 2". The numeral 2 indicates that there are two double EOF's, and that the first is to be ignored.

The first Summary listing is shown in Figure A-3. This contains several errors, which have been indicated by hand. Also, to take care of the change in attenuator setting, additional #1 and #2 headers will have to be inserted in blocks #3038 and 3039. These block numbers were computed as follows:

Running time up to attenuator change

2220 to 0520 = 7 hours

Block count for 7 hours at rate setting of 5 per sec. and channel setting of 2 is given by

 $\frac{160 \times \text{Block Count}}{\text{Rate x Channels}}$ = $\frac{160 \times \text{Block Count}}{5 \times 2}$ = 7 x 3600 secs. ... Block Count = 1575

> Block number = starting block + block count = 1464 + 1575 = 3039

Correction of Disk File

The input stack for CORRECT is shown in Figure A-4, and a complete listing of program CORRECT is given in Appendix B. The stack contains HEADER cards for the insertion of new headers and DELETE cards for the deletion of some unwanted headers. The output listing from this program shown in Figure A-5 repeats these cards.

Note that the block numbers shown correspond to the block numbers in Figure A-3, and that the cards correct the errors indicated on this figure. The corrected file has been catalogued as EXNOY01A.

				<pre>Enput stack for program SUMM (Option 1, DISK FILE).</pre>		1737
HEQUEST(TAPE7,MT.VSN=VHRC01-Q20778,NOMFN6,N1,S) HEQUEST(TAPE8,*PF) FTN(L=0) FILE(TAPE7,RT=F,HT=K,FL=400,MBL=400,RB=1,CM=N0,AFS=100)TAPE IN BOX BY WINDOW. FILE(TAPE3,RT=F,HT=K,FL=340,MBL=340,RB=1,CM=N0,AFS=100) LOSET(FILES=TAPER) LOSET(FILES=TAPER) LOSET(FILES=TAPER) LOSET(FILES=TAPER) LOSET(FILES=TAPER) LOSET(FILES=TAPER) LOSET(FILES=TAPER)	6 • • • • INSERT FORTRAN PROGRAM "SUMMARY" 6 Summary Listing From Original Digital Data Acquisition system Tape no. Vhrcdi. Diskfile 2	Note: '&' represents a orange 789 card	'#' represents a blue 6789 card	Figure A-2.		

женникованиенски поликованиенски поликование поликование поликование поликование поликование поликование полико « Summary LISTING FHOM ORIGINAL DIGITAL DATA ACGUISITION SYSTEM TAPE NO. VHRCOI. « чиски поликование поликование поликование поликование поликование поликование поликование поликование поликова	JUEST OPTION = DISKFILE ILL BE TERMINATED AFTER 2 DOUBLE EOF'S	DESCRIPTION ON THE BLOCK(S)	 CALIBRATION: CHAN, NO.= 1 SITE NUMBER= 001 SENSOH LOCATION= 206 LIN OR DB= 1 CAL, LEVEL= 07400 SAMPLING HATE = 5 CHANNELS = 2 P************************************	<pre></pre>	CALIBRATION: CHAN, NO.= 2 SITE NUMBER= 001 SENSOM LOCATION= 206 LIN OR DB= 1 CAL, LEVEL=05400 SAMPLING RATE = 5 CHANNELS = 2 ***********************************	START MODE 1	NO. OF MODE I BLOCKS WITH OVER SIZE ERHURS = 0 NO. OF MODE I BLOCKS WITH PARITY ERRORS = 0 NO. OF MODE I BLOCKS READ EXCLUDING ERRORS = 75 NO. OF MODE I BLOCKS READ INCLUDING ERRORS = 75 DATA COLLECTION TIME = 0 HOURS I0 MINUTES 0 SECONDS	**************************************	MAIN НЕADER: START TIME= 05/19 15:00 РНОЈЕСТ NO.= 1183 ЈОВ NO.= 908 озабечезереберебереската соловение соловение соловение соловение соловение соловение соловение соловение соловени	START MODE 9	EOF ENCOUNTERED EOF REPLACED BY DUMMY DAIA BLOCK ON OUTPUT DISK FILE	44444444444444444444444444444444444444	OVERSIZE BLOCK OCCURED AND SO FAR 1 TIMES Figure A-3. First summary listing from program SUMMARY.
	DISK FILE REG PROCESSING WI	DISKHLOCK	<u>.</u>		5	E			78	61	1365		

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Figure A-3 continued

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<pre>gure A-3 continued ####################################</pre>	CONTERED EOF KEPLACED BY DUMMY DATA BLOCK ON OUTPUT DISK FILE	DF MODE 9 BLOCKS WITH OVER SIZE ERRORS = 0 DF MODE 9 BLOCKS WITH PARITY ERRORS = 0 DF MODE 9 BLOCKS READ EXCLUDING ERRORS =5397 DF MODE 9 BLOCKS READ INCLUDING ERRORS =5397 COLLECTION TIME = 23 HOURS 59 MINUTES 12 SECONDS	E EOF ENCOUNTERED				
Figure 1463 MAIN + *****	5039 2 3039 2 1464 51AR	00 00 00 00 00 00 00 00 00 00 00 00 00	***** 000/BLE	A-10			-

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				A-11		

Figure A-3 continued

1744 Input stack for program 1 CORRECTION Figure A-4. - - - -END ORIGINAL DIGITAL DATA ACOUISITION SYSTEM TAPE NU. VHRCOL. INSERT FORTHAN PROGRAM "CORRECTION" 12001206105000520 11001206107400520 12001206105000520 20520052011839080 FILE(TAPE7,RT=F,BT=K,FL=340,MHL=340,RB=1,CM=NU) FILE(TAPE8,RT=F,61=K,FL=340,MBL=340,RB=1,CM=NO) 12001206106000520 CATALOG (TAPER.EXNOYOIA, HP=30) ì OF DECK. NUY TST, 02076F • T500-HAVILAND ATTACH(TAPE7, EXNOYOL) HEQUEST(TAPEH, *PF) END 369 3039 1368 1376 378 379 380 370 375 382 383 30.48 374 377 381 1384 N 1371 372 373 LUSET (FILES=TAPE7) LDSET (FILES=TAPEA) CORRECTIONS TO ⇒ ٦ F IN (L=0) ≎ DELETE OELETE DELETE DELETE HEADER HE ADE R HÉ AUÈ H HE ADER DELETE DELETE DFLETE DELETÉ HEADER DELETE DELETE UELETE DELETE DELETE DELETE t 60. ٦ ð # ے A-12

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7 4 4	22	1368	1369	1370	1371	13/2	1373	1374	1375	1376	1377	1378	1379	1380	1381	1382	1383	1384	3038	3039			
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Figure A-5 continued		
EUP WAS ENCOUNTERED ON THE UNCORRECTED FILE		
THE CORRECTED FILE WAS CLOSED		
VO. OF BLOCKS PROCESSED ON THE UNCORRECTED FILE = VO. OF BLOCKS PROCESSED ON THE CORRECTED FILE =	6861 6861	
A-14		

Second Summary Listing

The input stack for SUMM (Option 2, CORRECT) is shown in Figure A-6, and the summary listing itself is shown in Figure A-7.

Comparing Figure A-3 and A-7, it will be seen that the necessary corrections have been made to the file and that it now contains three data sets, with the last of the two in Figure A-3 having been split by the insertion of a #1 header for channel 2 in block 3038 and a #2 header in block 3039. It was not necessary to supply a #1 header for channel 1 because it remained the same as before. Also, new calibration signals were not required because the previous ones remained valid. This illustrates the logical makeup of the ANOISE program which uses data from the most recent header or calibration signal.

First Analysis

The input stack for the ANOISE run is shown in Figure A-8, and the output listing itself is shown in Figure A-9. Note that the output consists of headings derived from the headers on the file, together with three tables, each having a separate row for every channel. The output is largely self-explanatory, and the reader is referred to the section of the main text under the heading ANALYTICAL RESULTS for derivations. However, the following comments are offered.

- First Table: This supplies some general information on the calibration. Note that
 - (i) L_E REFERENCE lists e (as L₅₀, etc.) and (Lej)_c.
 - (ii) CORRECTION FACTOR is the CALIBRATION
 LEVEL minus LE REFERENCE (LCALj (Lej)_c).
 This is to be added to the raw data
 to obtain LEQ and LE.
- Second Table: This supplies the raw (uncalibrated) percentage levels on each channel during the calibration. Since a uniform calibration tone is used, the values should be practically constant between L99 and L1, as indeed they are on channel #2. However, on channel #1 they vary considerably. A large part of this variation was attributed to the fact that the hand-held calibrator gave only a one-minute tone during a ten-minute recording, so that anything below L₁₀ was incorrect (an obvious procedural error). Variations above L₁₀ were noted on channel #1 during

Input stack for program SUMMARY (Option 2, CORRECT). i ħ Figure A-6. * * * * INSERT FORTHAN PROGRAM "SUMMARY"
 CORRECTED LISTING OF ORTGINAL DIGITAL DATA ACGUISITION SYSTEM TAPE NO. VHRCOL.
 CORRECT
 * END Í ì FIN(L=0) FILE(TAPE7, RT=F, BT=K, FL=340, MBL=340, RB=1, CM=N0) LDSET(FILES=TAPE7) L60. 1 END OF DECK. Ţ MOYTST,02076F,T500.HAVILAND ATTACH(TAPE7,EXNOY01A) 44.1 ł

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A-16

SK FILE REQUEST OPTION = CORRECT OCESSING WILL BE TERMINATED AFTER 1 DOUBLE EOF'S SKBLOCK DESCRIPTION ON THE BLOCK(S) 1 1 0 0 1 2 0 5 1 0 7 4 0 0 5 2 0 1 2 0 1 2 0 5 1 0 7 4 0 0 5 2 0 1 CALIBRATION: CHAN. NO.= 1 SITE NUMBER= 001 SENSOR LOCATION= 206 LIN OR DB= 1 CAL. LEVEL = 07400 SAMPLING RATE = 5 44444848484848484848484848484848484848	ажаярынынынынынынынынынынынынынынынынынынын	START MODE 1 NO. OF MODE 1 BLOCKS WITH OVER SIZE ERRORS = 0 NO. OF MODE 1 BLOCKS WITH PARITY ERRORS = 0 NO. OF MODE 1 BLOCKS READ EXCLUDING ERRORS = 75 NO. OF MODE 1 BLOCKS READ INCLUDING ERRORS = 75 DATA COLLECTION TIME = 0 HOURS 10 MINUTES 0 SECONDS	аавнамананананананананананананананананан	NU. OF MODE 9 BLOCKS WITH OVER SIZE ERHORS = 0 NU. OF MODE 9 BLOCKS WITH PARITY ERRORS = 0 NU. OF MODE 9 BLOCKS WITH PARITY ERRORS = 0
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Figure A-7 continued

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	NO. OF MODE II BLOCKS WITH OVER SIZE ERRORS = 0 NO. OF MODE II BLOCKS WITH PAHITY ERRORS = 0 NO. OF MODE II BLOCKS READ EXCLUDING ERRORS = 15 NO. OF MODE II BLOCKS READ INCLUDING ERRORS = 15 DATA COLLECTION TIME = 0 HOURS 2 MINUTES 0 SECONDS	START MODE 1	NO. OF MODE I BLOCKS WITH OVER SIZE ERRORS = 0 NO. OF MODE I BLOCKS WITH PARITY ERRORS = 0 NO. OF MODE I BLOCKS READ EXCLUDING ERRORS = 78 NO. OF MODE I BLOCKS READ INCLUDING ERRORS = 78 DATA COLLECTION TIME = 0 HOURS 10 MINUTES 24 SECONDS	2 0 5 1 9 2 2 2 0 1 1 8 3 9	MAIN HEADER: START TIME = 05/19 22:20 PHOJECT NO.= 1183 44444444444444444444444444444444444	START MODE 9	NO. OF MODE 9 BLOCKS WITH OVER SIZE ERHORS = 0 NO. OF MODE 9 BLOCKS WITH PARITY ERHORS = 0 NO. OF MODE 9 BLOCKS READ EXCLUDING ERHORS =1574 NO. OF MODE 9 BLOCKS READ INCLUDING ERRORS =1574 DATA COLLECTION TIME = 6 HOURS 59 MINUTES 44 SECONDS	аниканскопосте в в с с с с с с с с с с с с с с с с с	анаянаяваяется в страная в страная с с с с с с с с с с с с с с с с с с с
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Figure

	TOTAL STATISTICS	
·	THE NUMBER OF BLOCKS IN MODE 0 = THE NUMBER OF BLOCKS IN MODE 1 = THE NUMBER OF BLOCKS IN MODE 2 = THE NUMBER OF BLOCKS IN MODE 2 = THE NUMBER OF BLOCKS IN MODE 4 = THE NUMBER OF BLOCKS IN MODE 5 =	5 C C C C C C C C C C C C C C C C C C C
•	THE NUMBER OF BLOCKS IN MODE 6 = THE NUMBER OF BLOCKS IN MODE 1 = THE NUMBER OF BLOCKS IN MODE 8 = THE NUMBER OF BLOCKS IN MODE 9 = THE NUMBER OF EUF DUMMY BLOCKS BY DATA ERROH = THE NO. OF DUMMY BLOCKS BY DATA ERROH =	
	THE TOTAL NUMBER OF BLOCKS =	6861
	THE NUMBER OF BLOCKS THAT ARE OVERSIZED THE NUMBER OF BLOCKS WITH PARITY ERRORS	
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	L0CA 2004	MMNS 4	L 95 87.6	A SUMM.	87.6 59.2	L 95 87.6	57.9
	HANNEL 2	DATA	-1-99 85.8	DATU	85.5 58.2 DATA	L 99	56.9
			CHANL	CHANL	- 2	HANL	5

A-23

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PAGE

ANALYSIS OF ORIGINAL DIGITAL DATA ACUUISITION SYSTEM TAPE NO. VHRCUL.

1756				i	1		
, sa	INI 89.66 54.66 INI	88.6 60.0	<u>- INI</u> 91.5 61.6				·
MINUTE 0	40 66 68 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7 7	100.1 70.7	NPL 99.8 71.3				:
AND	3.1 3.1 3.5 (BLE DA)	3.4 4.6 4.6	1516 3.6 5.0				:
1 HOURS	3.4 3.4 5.9 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5 1.5	3.8 1.4	LEPS 5.5 1.8				
ALS OF	LEQ 92.0 59.6 00. PERC	91.5 58.9 98. PERC	460.5 58.4				
USING INTERV	L 5 L 1 96.4 100.0 63.6 63.6 1 ASEU UN 1	96.2 100.0 63.6 63.6	<u>L 5 L L</u> 95.7 100.1 63.6 63.6				
AT 21:00	20 1 19 19 19 19 19 19 19 19 19 19 19 19 1	- 1 93.9 .6 63.0 .6 63.0	20 <u>L 10</u> 9 92.8 8 62.8				
U ENUING	91.8 92 91.8 92 95.9 60 0 AND ENU	91.1 92 59.0 60	L-30 L 2 89.9 90. 58.2 59.		· · · ·		
15:00 AN			-1 40 -1 40 -57.2				:
ING AT	0 1 50	8 89.6 4 57.1 8661NN	0 L 50 4 88.2 7 56.4			i .	
BE GI NN	10 L 6	0 88 4	20 L 61				
NAL YS I S	A 114	7.0 88 4.9 55 HE TIME	HQ H + 9 H6 + 3 55				
15:00 A	1 20 1 20 1 20 1 20 1 20 1 20 1 20 20	85.7 8 85.7 8 54.0 5 7 FOR 11	L 90 L 83.3 8 53.2 5				
AY 19	55.1 55.1 51.0 51.0 51.0 51.0 50.0	84.6 53.4 5UMMAR	81.95 52.2		:		
Σ	0.0414 69.4 53.8 DATA	82.2 52.0 0ATA	L 99 78.9 50.7				
	CHANL 2 2 CHANI		CHANL 1 2	;			

Figure A-9 continued

other recordings, and were attributed to the passage of noisy vehicles during calibration.

Third Table: This supplies various descriptors averaged over the periods selected by the user. Note that a time period cannot start earlier than the starting time on the #2 header, 1500 hours in this example. However, it will always end at the actual time at which the data recording ended, if this is less than the time requested; for example, the last period shown ends at 2043 hours rather than 2100 hours. The percentage usable data supplied in the subheading reflects the number of dummy blocks encountered during the analysis of the disk file.

Second Analysis

Because of the bad calibration on channel #1, data must be recovered by a second analysis. The input stack for this is shown in Figure A-10, but no output is shown.

The essential probem is to determine an effective value since the calibrator was not on 50 percent of the time. This can be done as follows

(i) The maximum uncalibrated reading possible from the 12-bit system is

20 $\log_{10}(2^{12} - 1) = 72.25 \text{ dB}.$

This reading is obtained when the signal to the A-D converter is 10 V.

- (ii) According to Figure 8, the maximum 2204 output is 1.73 V, corresponding to 16.9 dB.
- (iii) The gain between the 2204 and the A-D converter is 5.

Thus, given the meter setting value during calibration (LSET), the uncorrected L_{p} value should be

 $L_{e} = 20 \ \log_{10} (2^{12} - 1) - 20 \ \log_{10} 10$ + 20 \log 10⁵ + 20 \log 10₁₀ 1.73 - 16.9 + LSET = 54.1 + LSET.

Figure A-9 continued

A-26	N0Y1S1, FINELE FILE (TAF Control FILE (TAF Control Malysis Mal	20165 1 APE1 - E 2 0F 0 5 0F 0 1 5 1 5 1 5 1 5 1 5 1 5 1 5 1 5	1500. 1000	HAVILA 14) K.F.L=1 L UIGI 1:00 0	ND 1.00 1.00 1.00 1.00	340,ŘH Rogram L10 ácg	=20,CM	= NU) 5 E + 0 N S Y S		VHR C01.		· · · · · · · · · · · · · · · · · · ·				
l t			:								:					

1758

1759

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1760

Example 1. Channel #1. According to Table A-1, the value for LSET was 3.5 dB (i.e. the meter reading was 83.5 dB. Therefore,

 $L_{\alpha} = 54 \cdot 1 + 3.5 = 57.6$

This is close to the L_{10} value of 57.9 dB listed in the second table of Figure 9; therefore L_{10} was entered in the input stack shown in Figure A-10.

Example 2. Channel #2. With LSET equal to 3.5 dB again, L_e is again 57.6, which is sufficiently close to the value 57.4 obtained for L80 to L30. There-fore, L can remain at L50 on channel #2. Since this is the default value, it need not be entered into the cards shown in Figure A-10.

APPENDIX B

LISTINGS OF COMPUTER PROGRAMS

Listings of the computer programs SUMM, CORR, and ANOISE are supplied in Figures B-1, B-2, and B-3, respecively. These programs are operational on the CDC CYBER computer, but would possibly require some changes before running on an IBM computer. Since the sample output was prepared for Appendix A, there has been some minor editing of the output formats.

	MOYTSI,920780,1500.HAVILAND- RUN#2 HEAUESI(LGO,*PF) FIN(L=U) CATALOG(LGO,SUMMARY2,RP=10)	
	с LISTING OF FURTHAN PROGRAM "SUMMARY" С	
	С PROGRAM SUMM([NPUI.0UIPUI.TAPE5=]NPUI.TAPE6=0UIPUI.]APE7,]APE8)	
	INTEGER BUF (40), HEADER(16), LHEADER(2,16), MODE CNT(10), CHANNEL(8), - TOTMODE (20), DUMHE AD(34), DUMDATA(34) - TITLE (8) INTEGER MODE + MODE - HLOCK, LHLOCK, BLOCCNT - HLOCK, DETT - HLOCK, DETT - HRMODE - HRMODE - HRMODE - HARDOF - HAR	
B-2	CHLUCK=THE NO. OF ALUCKS INCLUDING PARITY ERROR. OVER SIZE BLOCK C BUT EXCLUDING EOF;USED FOR TIME OF RECORDING. C	
2	<pre>Dafa MODECNT/10*0/ - 101MUDE/20*0/ - HLOCK+LHLUCK+BLOCCNT/3*0/ - NIDKRLU/1/ - MODPRTY-PRTYCHT/2*0/ - MODVS2.0V52CNT/2*0/ - MEUF HDEOF/2*0/ - 0RUE 35.AUF (35)/2*0/ - 0RUE 35.AUF (35)/2*0/ - 0RUE 400/2*0/ - 0PTION/BHNONE - 015K-CONRECT/FALSEFALSE./ - 0UMUATA /34*12121212121212121212121212121212121212</pre>	Figure B-1. Listing of Fortran program "SUMMARY".
	Санананиоваасякиананскакаевалаеванаеванаеванаеванаеванаеванаеван	- - - - -

Figure B-1 continued

C-----TERMINATE PROCESSING(DEFAULT IS 1)

C-----IF NEED A SUMMARY TABLE ON CURRECTED FILE, PUNCH "CORRECT" ON A C-----CARD FROM COL 1 THRU 7

C-----KEAD COMMAND CAHD READ (5.1400) OPTION.DEOFLV 1400 FORMAT(A8.2X.11) 15 (EOF(5)) 105.101 101 IF (OPTION.E0.8H015KFILE) 50 10 103 IF (UPTION.E0.8HC0PRECT) 50 10 104 C----IF NOT ROTH, THEN ERROR COMMAND WRITE (6,1600) 1600 FORMAT(1X,"EHROR CUMMAND CARD"/)

C-----NEED TO CREATE DISK FILE 103 DISk=.TRUE. IF (DEOFLV-E9.0)DEOFLV=1 60 TO 105

510P

C----NEED SUMMARY TABLE ON CORRECTED FILE 104 CORRECT=.TRUE.

104 CURRECT=.IRUE. 16 (DEOFLV.EQ.0)DEOFLV=1 60 TO 105 C-----WRITE OPTION COMMAND AND DEUF LEVEL FOR THE FILE PROCESSING 105 WRITE(6.1500) OPTION.DEOFLV

105 WHITE(6,1500) OPTION.DEOFLV 1500 FORMAT(1x,*UISK FILE REQUEST OPTION = *,AM/

- IX.*PPROCESSING WILL BE TERMINATED AFTER *,II.

- * 00018LE E0F • 5*77)

C-----REITE DESCRIPTION HEAD LINE WHITE(6,1300)

1300 FORMATI 1X,*DISKRLOCK*+15X+*DESCRIPTION ON THE BLOCK(S)*//)

C-----READ A BLOCK FROM UNCORRECTED FILE (HLOCK SIZE=400 CHARS). OH C PEAD A HLOCK FROM CORRECTED FILE (BLOCK SIZE=340 CHARS) I F(CORRECT)BUFFFR IN (7,1) (HUF(1),HUF(34)) IF(.NO1.CORRECT) RUFFER IN (7,1) (BUF(1),HUF(40)) IF(.NO1.CORRECT) RUFFER IN (7,1) (BUF(1),HUF(40))

С----РАКЦТУ ЕКROR HLOCK. 33 ЕКRMODE=6HPAKITY РКТҮСИТ=РКТҮСИТ+1

TE (LOUE FORMODE) MODPRTY=MODPRTY+1 TE (MODPRTY-66.5) 60 10 93

C----JF NO ERROR IN THE BLOCK 11 BLOCK=BLOCK+1

DECODE (17.2000.NUF (1)) (HEADER(1).I=1.16),MODE DECODE (17.2000.NUF (1)) (HEADER(1).I=1.16),MODE 2000 FORMAT (681.81) 101MODE (MODE+1)=101MODE (MODE+1)+1 NEOF=0 NEOF=0

C-----CHECK WHETHER OVERSIZE ALOCK OR NOT 1F (ORUF35.F0.BUE(35))12,13

Figure B-1 continued

20x,*N0. OF MODE*,13,4 BLOCKS READ EXCLUDING ERRORS =*,14,/ 20x,*N0. OF MODE*,13,4 BLOCKS READ INCLUDING ERRORS =*,14,/ 20x,*DATA COLLECTION fIME = *,12,* HOURS*,13,* MINUTES*, #NO. OF MODE*,13,* BLOCKS WITH OVER SIZE ERRORS = 4,14,/ ERRORS = *, 14,/ 12 IF (EPRMODE .NE. 6HPARITY.AND.ERRMODE.NE.BHOVERSIZE) FRRMODE=4H6000 wklie(6,210011,M00F,M000vSZ,LM00E,M00PRIY,LM00E,BL0CCNI. 20X.ªNO. OF MODEª.13.ª BLOCKS WITH PARITY - (HEADER(I), I=6,8), HEADEP(9), (HEADER(I), I=10,14), 77 IF (HEADER(1), FU, 1) WRITE (6, 2250) HEADER, MODE 13 IF (ERRMODE.NE. 6HPARITY) ERRMODE=BHOVERSIZE 2200 FORMAT(1X,16,3H---,10X,*START MODE *,13,7) 55 IF (ERRMODE.EQ.446000) BLOCCNT=BLOCCNT+1 DPTIME = (DPBL0CK*20*8) / (RATE*NCHANEL) If (LM0DE.E0.M00E) M0D0VS7=M0D0VSZ+1 IF (EPRMODE.EU.BHOVERSIZE) MOUDVSZ=1 I SE C = DPT I ME - JHOUR* 3600 - I M J NUTE*60 IF (ERRMODE.EQ.6HPARITY) MODPRTY=1 IHOUP , IMINUTE , ISEC I M I NUTE = (DPT I ME - I HOUR® 3600) /60 1F (.NOT.CORRECT) ORUF 35=8UF (35) IF (NDE.0F.+F0.-DE.0FLV) 60 T0 8 LMODE, UPRLOCK, 7 WHITE (6.2200) DISKBL0,MODE IF (M000VSZ.6E.5) 60 F0 94 C----GOOD BLOCK WITHOUT ERROR if (MODE.E0.0)5.4
4 if (LMODE.E0.MODF)55.5
5 if (HLUCCUIT.E0.0)66.6
6 MATE=LHEADER(1,15) IF (LMODE .NE . 9) RATE=10 20X,100(1H-)//) NCHANEL=LHEADER(1+16) 13,* SECONDS*/ -HEADER(15) +HEADER(16) DPBLOCK=RLOCK-LBLOCK -D1SkBL0+HEADER(2)+ IF (MODE.E0.0)77.7 - (HEADER(I) . I=3.5), 0VSZCNT=0VSZCNT+1 I HOUR=DPTIME / 3600 BLOCK. 2100 FORMAT(1H0.19X. C----hEADER RLOCK. LHLOCK=BLOCK C----DATA RLOCK. 46 LMODE=MODE C-----0VEH SIZE HL0CCN1=0 0=7TH400M 0=ZSV0(IOM 60 IO 88

CHAN. NO.=.I2.54, *SITE NUMBER=*.2X.311.5X.

SENSOR LOCATION=+IX.311/

•

2250 FOPMAT(20X,100(1H#)/ 20X,16(14),5X,13//

-1X,16,3H---,10X,*CAL[BRATION:

B**-**4

EOF REPLACED BY DUMMY DATA BLOCK ON DUTPUT DISK FILE/) C----IF WANT TO SEE THE INSTOR OF DUMMY BLOCK. PUT SOME CODE HERE 2500 FURMAT(20X,*PARIIY ERROR OCCURED AND SO FAR*,13,* TIMES*/) -C-----DOUBLE FOF IS MET SO INCHEMENT PRESENT BLOCK POINTER BY - (HEADER(I),I=4.5), (HEADER(I),I=6,7), (HEADER(I),I=8,9), 2400 FORMAT(1X,16,3H---,10X,5(020,3X)/ 7(20X,5(020,3X)/)/) IF (HEADER(L).EQ.2) WRITE (6.2260) HEADER, MODE, -5X, "PROJECT NO.=",1X,411,5X,"JOB NO.=",1X,311/ 2750 FORMAT(1X+16,3H---,10X,*EOF ENCOUNTERED -- *. -*STAPT TIME=*.1X.211,*/*,211,1X.211,*:*,211, 92 IF (MODE.6E.10.AND.CORRECT) WRITE (6,2600) 2600 FORMAT(1H+,80X,00*80UMMY RLOCK OCCURED***//) If (.NOT.CORRECT) TOTMODE (]]) = TOTMODE (]]) +1 - (HE ADE H(I), [=10,13), (HE ADE H(I),]=14,16) 2260 FORMAT(20X,100(1H#)/ 20X,16(14),5X,13// 9 IF (.NOT.CORRECT) WRITE (6.2750) DISABLO * AND SO FAH * 13.* TIMES*/) 2300 FORMAT (20X, "OVERSIZE HLOCK OCCURED ", IF (EMRMODE.EQ.BHOVERSIZE) MODOVSZ=1 -IX.I6.3H---, I0X.ªMAIN HEADER: 4. IF (ERRMODE . EQ. 6HPARITY) MODRIY=1 84 IF(ERRMODE.EQ.8HOVERSIZE)A9,90 89 WRITF (6,2300) UVS7CNT 100 LHEADER(HEADER(1).1)=HEADER(1) 99 IF (NDE 0F.EQ.DE 0FLV-1) 60 T0 10 IF (ERRMODE.EQ.6HPARI [Y) 9],92 -015KBL0, (HEADFR(1),1=2,3). WRITE (6,2400) DISKBL0, BUF WRITE (6,2400) DISKBL0, HUF -34X+*CHANNFLS =*+12/ - 20X+100(1H*)//) 20X+100(1H#)//) 91 WRITE (6,2500) PRTYCNT 2800 FURMAT(20X, 100(1H*)/ 22 IF (NEOF.E0.1)99.9 C----LOF IS GREETED 00 100 1=1,16 10 BLOCK=PLOCK+1 NUE OF = NUE OF + 1 8 WKITE(6+2800) E.KRM01)E.=3HE0F NE OF = NF OF + 1MUDPR1Y=0 M000057=0 60 TO 111 60 TO 111 60 IO 6 <u>6</u>0

20X+*000HLE EOF ENCOUNTERED*/

IF (NDEOF.E0.0E0FLV) 60 T0 95

NDEOF =NDEOF +]

60 IO 1

20X+106(1H*)//)

B-1 continued Figure C----IF DISK FILE NEEDED, CREATE DISK FILE

- 111 IF (DISK)112-113 112 IF (ERRMODE.EQ.3HEOF) BUFFER OUT (8.1) (DUMHEAD(1),DUMHEAD(34)) lf(EARMODE_EQ_4H600D) BUFFER OUT (8.1) (BUF(1).4BUF(34))
 lf(ERRMODE_EQ_8HOVEASIZE_OR.ERRMODE_EQ_6HPARITY)
 - HUFFER OUT (8.1) (DUMDATA(1). DUMDATA(34)) ı
 - IF (UNIT(8))113+113+113
 - 113 DISKRLO=DISKRLO+1
- IF (COPRECT.AND.ERRMODE.EQ. 3HEOF) DISKRL0=DISKRL0-1 E RRMODE = 5HCLEAR 60 10 1

93 IF(MODPHTY.GE.5) WRITE (6.3000) 3000 FORMAT(1X,*TOU MANY PARIIY ERROHS.EXECUTION STOPS*/) C----CLOSE FILE, AND WRITE TOTAL STATISTICS FOR THE FILE

94 IF (MODOVSZ.GE.5) WHITE(6+3100) 3100 FORMAT(1X+*TOO MANY OVERSIZE HLOCKS,EXECUTION STOPS*/)

95 WHITE(6+3200) 3200 FORMAT(1H1+19X+*fOTAL STATIST1CS*/ (/*-----

WRITE (6+3300) N, TOTMODE (1) 00 200 I=1,10 [-]=N 200

=*,[]]) 3300 FORMAT(20X, *THE NUMBER OF BLOCKS IN MODE*,12,*

= *, 111) 3350 FORMAT(20X+*THE NUMBER OF EUF DUMMY BLOCKS*+* IF (CORRECT) WRITE (6,3400) TOTMODE (12) WHITE (6,3350) TOTMODE (11)

3400 FURMAT(20X.*THE NO. UF DUMMY BLOCKS BY DATA ERROR = *,110/)

/*--. = + + 111// 20X,*THE TOTAL NUMBER OF BLOCKS WRITE (6.3500) DISKBLO 3500 FORMAT(20X.*------015KHL0=015KHL0-1

WRITE (6+3600) OVSZCNI, PRIYCNT

3600 FURMAT(20X,"THE NUMBER OF BLOCKS THAT ARE OVERSIZED",110/ - 20X,"THE NUMBER OF BLOCKS WITH PARITY ERRORS",110/) S10P

E NU

END OF DECK.

END

								Figure B-2. Listing of Fortran program "CORRECTION".	·			767	?
C LISTING OF FORTHAN PROGRAM "CORRECTION"	PROGRAM CORR(INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE7,TAPE8)	INTEGER HEADHLK(20),HEADINE(20,17),TEMP(17), - DELENLK(20),TITLE(0) - HUF(34) - DUMHEAD(34) - DUMDATA(34) - BLOCK - OLDBLK,NEWHLK	<pre>Dafa HEADHLK/20*0/.HEADINF/340*0/ DELEBLK/20*0/ - DELEBLK/20*0/ - DUMHEAD /34*121212121212121214/ - DUMDATA /34*1313131313131313131313131 DUMDATA /34*131313131313131313131 OLUBLK.NEWHLK/2*0/1.J/2*1/.11.JJ/2*1/</pre>	ϕ	CKEAD TITLE, AND WRITE THE TITLE READ(5,1100) TITLE 1100 FORMAT(8A10) WRITE(6,1200) TITLE 1200 FORMAT(1H1,23X,84(1H*)/ - 24X,2H*,84(1H*)////)	(СКЕАŬ COMMAND CARDS AND STORE THEM INTO APPROPHEATE COMMAND ARRAY СYOU CAN CORRECT 20 HEADERS AND DELETE 20 HLOCKS DUMING ONE RUN	CCUMMANU CARD FURMAT C C COMMAND (COL 1 COL 6, LEFT JUSTIFIED) C DISK BLOCK NO. (COL 16 COL 20, PIGH1 JUSTIFIED) C NEW CORPECTION (COL 31 COL 47, LEFT JUSTIFIED)	5 HEAD(5,1000) CUMMAND.BLOCK.TEMP 1000 FOHMAT(A6.9X,15.10X,1711) 1F(EOF(5))7.2 2 WHITE(6,1500) CUMMAND.HLOCK.TEMP 1500 FORMAT(1X,46,9X,15.10X,1711/)	CFRIOR PROCESSING ON THE COMMAND CARDS	CIF EAROH ON THE ALOCK FIELD OF THE COMMAND CARD IF (BLOCK.EQ.0) 60 TU 61	CIF EHRUR ON THE CONTENT OF CORRECTION FIELD OF THE COMMAND CARD IF (COMMAND.EQ.6HHEADER.AND.TEMP(1).EQ.0) GO TO 62	IF (COMMAND.EQ.6HHEADER) 60 TO 3

IF (COMMAND.EQ.6HDELETE) 60 TO 4

.

B-2 continued Figure C-----IF ERROR ON THE COMMAND FIFLD OF THE COMMAND CARD 1300 FORMAT(1X,"ERROR ON COMMAND FIELD"/) WRITE (6+1300) 510P

1600 FORMATCIX, "FRHOR ON BLOCK FIELD"/) WHITE (6,1600) S10P 61

62 WHITE (6.1700) 1700 FORMAT(1X,"EAROR ON CONTENTS OF CORRECTION FIELD"/)

510P

C----IF COMMAND IS HEADER CORRECTION, STORE THE COMMAND ON HEADBLK AND Ç

3 HEADHLK (1) =BLOCK HEADINF ARRAYS

HE AD INF ($] \cdot K$) = TEMP (K) DO 100 K=1,17

100 1EMP (K)=0

I = I + I

HLOCK=0

60 10 5

C-----IF COMMAND IS DELETE BLOCK, STORE THE COMMAND ON DELEHLK ARRAY

4 DELEPLK(J)=BLOCK

13L 0 C K = 0 ー・しょし

60 10 5

B**-**8

C-----HEAD UNCORRECTED FILE C----NOW PROCESS COMMANDS

7 BUFFER IN (7,1) (RUF(1), BUF(34))

IF (UNIT(7))11.22.33 01.001K = 01.04LK + 1

C----IF PARITY ERROR ON UNCORRECTED FILE, WRITE THE LOCATION AND DUMP THE BLOCK

33 WRITE (6,2000) OLDHLK 2000 FORMAT(20X,*PARITY ERROR OCCURED AT HLOCK*,167) WKITE(6,3000) BUF

3000 FORMAT (20X+5(020+3X)/5(20X+5(020+3X)/)+20X+4(020+3X)/)

C----IF 600D READING

C-----REPLACE THE INCORRECT HEADER BY NEW HEADER

11 IF (0LDBLK.EQ.MEADHLK([]))14.13 14 ENCODF(17,4100.80F(1)) (HEADINF(II,K),K=1.17)

4100 FORMAT(17H1)

17 BUFFER OUT (8.1) (BUF(1).BUF(34)) NF WBL K = NE WHL K +]

IF (UNIT(8)) 7.7.7

- ה דצמד.ב ה-ד החזורדוומבת
- 16 BUFFFR OUT (8.1) (DUMDATA(1), DUMDATA(34)) 1.00=00
 - IF (UNIT(8))7+7+7 NEWBLK=NEWBLK+1

C-----EOF WAS ENCOUNTERED ON THE UNCORRECTED FILE. SO CLOSE THE CURRECTED FILE 22 WRITE (6,4500)

- 4500 FORMAT(1)H1, "EOF WAS ENCOUNTERED ON THE UNCORRECTED FILE"/) WHITE (6,7000)
 - 7000 FORMAT(1X, "THE CORRECTED FILE WAS CLOSED"//)

C-----CHECK IF ALL OF THE COMMANDS HAVE BEEN PROCESSED COMPLETELY IF ([1.L1.L]) WRITE (6,5000)

5000 FORMAT(1X, *HEADER COMMAND HAS NOT COMPLETLY PROCESSED*/) IFIJJ.LT.J) WRITE(6,6000) 6000 FURMAT(1X,*DELETE COMMAND HAS NOT COMPLETLY PROCESSED*/)

C-----COMPARE THE NO. OF BLOCKS PROCESSED ON THE UNCORRECTED FILE WITH THE NO. OF BLOCKS PROCESSED ON THE CORRECTED FILE с О

- 0LUHLK=0L0ALK-1
 - WRITE (6,6500) OLDBLK, NEWBLK
- ÷. 6500 FORMAT(1X, "NO. OF BLOCKS PROCESSED ON THE UNCORRECTED FILE =
 - H CORRECTED FILE 1X, "NO. OF BLOCKS PROCESSED ON THE 18/) I H / ī

B**-**9

S10P END

NOISE DATA MALYSIS PROGNA WITTER FOR WITTER FOR WIT	PRUGRAM ANDISF (I	INPUT,OUTPUT,TAPE5=INPUT,TAPE6=OUTPUT,TAPE1)		
WOTTER FOR INE VIRGINIA AND TRANSPORTATION RESERPCH COUNCIL R GERV L. NORT RESERPCH LOUNCIL RESERPCH LOUNCIL INTER RESERPCH LOUNCIL INTER RESERPCH COUNCIL INTER RESERPCH LOUNCIL AND PROCESSES INTER RESERPCIFIED IN UR. MAVILAND"S JUNE 24111 COMMON TO THE ADDITION RESERPCIFIED IN UR. MAVILAND"S JUNE 24111 COMMON TO THE ADDITION RESERPCIED AND PROCESSES INTERIA SECTIFIED IN UR. MAVILAND"S JUNE 24111 COMMON TO ATTERIA SECTIFIED IN UR. MAVILAND"S JUNE 24111 COMMON TO ATTERIA SECTIFIED IN UR. MAVILAND"S JUNE 24111 FEATURY OF THIS ADDITION RESERPCENCE THEORER ADDITION RESERVENCE THEORER ADDITION RESERVENCE <td< td=""><td></td><td>NOISE DATA ANALYSIS PROGRAM</td><td></td><td></td></td<>		NOISE DATA ANALYSIS PROGRAM		
THE VIGNILA HIGHMAY AND TRANSPORTATION RESERTEN COUNCIL R T T T T T T T T T T T T T		WRITTEN FOR		
BY LEMY L. KOR BESEARCH LNOINEE RESEARCH LNOINEE RESEARCH LNOINEE RESEARCH LNOINE RESEARCH LNOINE RESEARCH LNOINE RESEARCH LNOINE READENT AFTEL THE THAFL AND PHOLESSES THIS PHOGRAM READS A CORRECTED NUISE UNIT MAYLLANOWS JUNE 24TH RPO. COMMON / MEANNOW MONTH, DAY BOUCESSES THE ATTANC/ MONTH, DAY BOWIN, DAY READE READENT AFTEL THE TITLE READENT AFTEL THE TITLE READENT AFTEL THE TITLE READENT ATTANC/ MONTH, DAY READENT AFTEL THE TITLE READENT AFTEL THE TITLE READENT AFTEL THE TITLE AFTEL READENT AFTEL THE TITLE AFTEL AFTEL READENT AFTEL THE AFTEL AFTEL AFTEL READENT AFTEL TO THAT AFTEL AFTEL READENT AFTEL THE AFTEL AFTEL AFTEL READENT ATTANCIA THAT AFTEL READENT AFTEL THAT AFTEL AFTEL READENT AFTEL THAT AFTEL AFTEL READENT ATTANCIA THAT AFTEL AFTEL READENT ATTANCIA THAT AFTEL AFTEL READENT ATTANCIA THAT	THE VIRG	GINIA HIGHWAY AND IRANSPORTATION RESEARCH COUNCIL		
<pre>Jemr L. KOF BESEARCH FUNITER BESEARCH FUNITER FILS PHORMA MEADS A CORRECTED NUT AFILE (TAPE1) AND PROCESSES FILS PHORMA MEADS A CORRECTED NUTS MUT AFILE (TAPE1) AND PROCESSES FILS FULLY (FILS) (FILS)</pre>		вү		
<pre>His PHOGHAM HEADS A CORRECTED NOISE UAIA FILE (TAPE1) AND PROCESSES HIM ACCOMPTING TO THE CALIFIED IN UR. HAVLLAND"S JUNE 24TH ACCOMPTING TO THE CALIFIED IN UR. HAVLLAND"S JUNE 24TH ACCOMPTING TO THE CALIFIED IN THAVE, TILLE ADD ACCOMPTING TO THE CALIFIED IN TECHNISH, ELEPSION AND ALLAND ACTION AND ACTION TO THAVE TO THAVE ADD ACTION SOMETHING ACTION EPSCALON ACTION SOMETHING TO THAVE TO THAVE TO THAVE TO ACTION SOMETHING ACTION FEASANT ACTION SOMETHING ACTION FEASANT ACTION SOMETHING ACTION FEASANT ACTIONAL CALANDS, CALNUM, DATIAN SOLTAN MURICI) INTEGER PAGE TINE TILEEUD CALANDS, CALNUM, DATA ACTIONAL CALANDS, CALNUM, DATANA ANDAY HOWA PAGE TINE TILEEUD CALANDS, CALNUM, DATA HOWAL CALANDS, CALNUM, DATANA ANDAY, HIM ACTIONAL ACTIONAL CALANDS, CALNUM, DATANA ANDAY, HIM ACTIONAL ACTIONAL CALANDS, CALNUM, DATANA ANDAY, HIM ACTIONAL ACTIONAL CALAND AND ACTIONALS, CALNUM, ANTING 22) ADD ATTANA ATTAN</pre>		JERRY L. KORF Research Engineer		
<pre>COMMON /HEADNG/ MONTH, DAY, BGNITM, ENDIM, INTRVL, TILE Hell X00001, CATHVIAI, LL(13), LECAL(1300), ELEPS(0), ELEPS(0), ELEPS(0), ELEPS(0), LECOLOB), CATHVIAI, XSORD, EPSCAL(0) t.E(0), LEPS, LSIG, WCL, THILE(0), XSORD, EPSCAL(0) t.E(1), LEPS(10), SXRTH(0), XSORD, EPSCAL(0) HAL X00001), BANKT, DAY, MNNDT(2), MNNT(2), MNNT(2</pre>	THIS PROGRAM READS IT ACCORDING TO TH MEMO.	S A CORRECTED NOISE UATA FILE (TAPEI) AND PROCESSES HE CRITERIA SPECIFIED IN DR. HAVILAND"S JUNE 24TH		
	COMMON /HEADNG/ HEAL XCOR(8), HEAL XCOR(8), COR(8), LOC(8), LOC(8), LOC(8), COR(8), LOC(8), COR(8), C	<pre>/ MONTH, DAY, BGNTIM, ENDTIM, INTRVL, TITLE MINI Caltur(R), LL(1)3), LFCaL(13,6), ELEPS(6), ELEQ(6) (a) SXSORS(8), SXFRIH(8), XSORD, EPSCAL(8) (b) SXSORS(8), SXFRIH(8), XSORD, EPSCAL(8) (b) SXSORS(8), SXFRIH(8), XSORD, EPSCAL(8) (b) BGNTIM(3), ENDTIM(8,4), MNHDR(6), INUUF(2), (b) BGNTIM(3), ENDTIM(8,4), MNHDR(6), INUUF(2), (c) BGNTIM(3), ENDTIM(3), INTRVL(2), MONTH, DAY, ATES(10), CHANLS, CALNUM, DATA(8), HISTO(8,1024), CUMLS1, DUMREC, L50, MNTIM, SCTIM, MNTHS(12), (c) CALBITM(8), RATE, PRINTS, ANLDAY, MINI (2),), CALBITM(8), RATE, PRINTS, ANLDAY, MINI (2),), OFFSET, PRSMNS CALHED(8), GOTREC, EOFLG, EODATA, NEWTIM, B) OFFSET, PRSMNS CALHED(8), GOTREC, EOFLG, EODATA, NEWTIM, B) JANUARY U, FEBRUARY U, MARCH U, CALHED(8), GOTREC, FOLG, EODATA, NEWTIM, B) JANUARY U, FEBRUARY U, MARCH U, CALHED(8), GOTREC, FOLG, EODATA, NEWTIM, B) JANUARY U, FEBRUARY U, MARCH U, CALHED(8), GOTREC, FOLG, EOTREC, / FALSE, / CALHED, EOFLG /10°, FALSE, / OCLHED, EOFLG /10°, FALSE, / OS, 11, 2, 2410/, CALNUM /9/, CHANLS /0/ /MILLVOLTSU, UECTBELSU/ /MILLVOLTSU, UECTBELSU/ /MILLVOLTSU, UECTBELSU/ SOL CARDS</pre>	Figure B-3.	Listing of Fortran program "ANOISE.
	PAGF = 0			

B-10

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c
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                27
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   PROCESS THE DATA REPORTING THE RESULTS AT THE SPECIFIED INTERVALS.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      " LEQ ",4X," LEPS ",2X,"REFERENCE",3X,"CALIBRATION LEVEL",3X,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       (MONTH .NE. MNHDR(1) .OR. DAY .NE. MNHDR(2) .OR.
HOUR .NE. MNHDR(3) .OR. MINIT .NE. MNHDR(4)) GO TO
                                                                                                                                                                                                                                                                                                                             READ DISK RECORDS STORING HEADER INFO UNTIL DATA BLOCK IS FOUND.
                                                 READ (5.1001) MONTH, DAY, HOUR, MINII, BGNTIM, ENDIIM, INTRVL,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ~~~~
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           =
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            " THROUGH CHANNEL ", I], //, 22X, "SENSOR", 26X, "LE", 57X,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          WHITE HEADER INFO FOR THE DATA PRESENTLY BEING PROCESSED
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            "CORRECTION FACTOR".3X,"UNITS".4X,"MINUTES SECONDS".
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 "TEST DURATION",/,12X,"CHANNEL",2X,"LOCATION",4X,
                                                                                                    1001 FORMAT (4(12,1X),2(12,1X,211,1X),2(12,1X),8(2X,12))
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       FORMAT (1H0.44X,"CALIBRATION TEST FOR CHANNEL 1",
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    :
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         UATA BLOCK FOUND NOW INSURE PRESENCE OF HEADERS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ", 3X, "
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ",3X,"
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           ", XE, "
                                                                                                                                                                                                                WHITE INITIAL PAGE HEADING AND SUBTITLE
                                                                                                                                                                                                                                                                                                                                                                                            GOTREC = .TRUE.
READ (1,1010) INBUF(1), INBUF(2), MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SCTIM = CALBTM(J) - MNIIM*60
1F (CALREF(J) .LE. 0) CALREF(J) = 50
                                                                                                                                                                                                                                                          LINFAC = 0
CALL PAGER (LINE+PAGE+LINFAC+MNTHS)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              CALL PAGER (LINE, PAGE, LINFAC, MNTHS)
                                                                                                                                                                       MINI(2) = MINII - (MINI(1) * 10)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ", 2X, "
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               İ
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IF (.NOT. CALHED(I)) GO TO 82
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        TEST = FLOAT(CALREF(J))/100.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   IF (CHANLS .LE. 0) 60 TO 81
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               IF (CALNUM .6T. 1) 60 TO 83
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   ", 2X, ",
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    (.NOT. MAINHD) 60 TO 80
                                                                               (CALREF(I), I=1,8)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      4 IF (MODE .EQ. 0) 60 TO 20
IF (MODE .NE. 9) 60 TO 30
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  , 2X,
Figure B-3 continued
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  WRITE (6.2100) CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           MNTIM = CALBTM(J) / 60
                                                                                                                                                                                                                                                                                                                                                                         IF (601REC) 60 T0 4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LINFAC = CHANLS + 6
                                                                                                                                                2 \text{ mini}(1) = \text{mini}(1)0
                                                                                                                                                                                                                                                                                                                                                                                                                                       1010 FURMAT (A10.A6.R1)
IF (EOF(1)) 88.4
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        UO 100 I=1,CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                00 120 J=1.CHANLS
                                                                                                                             IF (EOF(5)) 90,2
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 / • 1H • • 11X • "
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        3X+"__
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 100 CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                ы, хе
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ESTABLISH CALIBRATION REFERENCE LEVEL BY INTERPOLATION IF L SUBSCRIPT
                                                                   IS NOT A PREDETERMINED VALUE.
Figure B-3 continued
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ADVANCE TO PROPER BEGINNING POINT ON DATA FILE AND DETERMINE NUMBER
                                                                                                                                                                                                                                                                                                                                                                                                                                    :
                                                                                                                                                                                                                                                                                                                                                                                                                                                            1,1
                                                                                                                                                                                                                                                      2110 FORMAT (1H ,14X,11,7X,13,6X,F5.1,5X,F5.2,4X,"L",12,F6.1,6X,F8.2,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          THIS BRANCH IS TAKEN WHEN A REQUEST IS MADE TO USE THE SAME DATA
                                                                                                                                                                                                                                                                                                                                                                                                                                    L 50
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           CALLE = LECAL(K+1.J) - FACTR * (LECAL(K+1.J) - LECAL(K.J))
                                                                                                                                                                                                             WRITE (6,2110) J, CALHDR(J,2), ELEQ(J), ELEPS(J), CALREF(J),
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALL PAGER (LINE,PAGE,LINFAC,MNTHS)
WRITE(6,2200) MNHDR(5), MNHDR(6), CALHDR(1,1), CHANLS, RATE
                                                                                                                                                                                                                                  CALLE, CALHLV(J), XCOR(J), UNITS(I), MNTIM, SCTIM
                                                                                                                                                                                                                                                                                                                                                                           WRITE (6.2120)
2120 FORMAT (1H0,35X,"THE FOLLOWING ARE UNCORRECTED L VALUES ".
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   THIS BRANCH REPRESENTS A FIRST REQUEST FOR THIS DATA SET.
                                                                                                                                                                                                                                                                                                                                                                                                                                        60
                                                                                                                                                                                                                                                                                                                                                                                                                                      L 90 L 80 L 70 L
L 1",/,1H+,27X,14("_
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    HGNMNS = HGNTIM(1) * 60 + HGNTIM(2) * 10 + HGNTIM(3)
ENDMNS = ENDTIM(1) * 60 + ENDTIM(2) * 10 + ENDTIM(3)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       " CHANNELS AT A RATE OF ", I2," SAMPLES/SECOND")
                                FACTR = (TEST - LL(1-1))/(LL(1) - LL(1-1))
                                                                                                                                                                    ELEQ(J) = 20. * AL0610(EPSCAL(J)) + XC0R(J)
I = CALH0R(J,3) + 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      INTVLS = (60 * INTRVL(1) + INTRVL(2)) * 60
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          WRITE (6,2125) J, (LECAL (K,J),K=1,13)
                                                                                                                                                                                                                                                                                12X,F8.2,7X,A9,5X,I2,6X,I2)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                PRSMNS = PRSTIM(1) * 60 + PRSTIM(2)
                                                                                                                                                                                                                                                                                                                                                 CALL PAGER (LINE, PAGE, LINFAC, MNTHS)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              2125 FORMAT (1H , 29X, 11, 3X, 13(F5.1, 1X))
                                                                                                                                                                                                                                                                                                                                                                                                                                          L 99 L 95
00 121 1=1,13
JF (LL(I) .LE. TEST) 60 10 121
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             TIMREC = 8./FLOAT(RATE * CHANLS)
                                                                                                                                                                                                                                                                                                                                                                                                                                                            "L 40 L 30 L 20 L 10 L 5
                                                                                                                                                                                                                                                                                                                                                                                                                   "FOR THE CALIBRATION RUNS",
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    INTREC = FLOAT (INTVLS) / TIMREC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       SET AS THE PREVIOUS REQUEST.
                                                                                                                                    121 CONTINUE
122 XCOR(J) = CALHLV(J) - CALLE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       = HGNMNS - PRSMNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             REPORTS TO BE PRINTED.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        IF (NEWTIM) 60 F0 104
                                                                                                                                                                                                                                                                                                                                                                                                                                            /,1H0,26X," CHANL
                                                                                                                                                                                                                                                                                                                                  LINFAC = CHANLS + 5
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      U0 125 J=1, CHANLS
                                                                  K = 14 - 1
                                                                                                           60 T0 122
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        0
=
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LINFAC = 6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  G0 T0 105
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            125 CONTINUE
                                                                                                                                                                                                                                                                                                             120 CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        DUMREC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            UFFSET
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104 PRSTIM(1) = 86NTIM(1)

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DETERMINE THE NUMBER OF RECORDS TO BE SKIPPED BEFORE BEGINNING THE ANALYSIS; THEN ADVANCE TO THAT STARTING POINT.
                                                                                                                                                                                                                                                                                                                       DETERMINE THE NUMBER OF REPORTS TO BE PRINTED FOR THIS REQUEST.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF (MODE .NE. 9) GO TO 16
IF ((DUMREC + NUMREC) .GT. INTREC) GO TO 17
                                                                                                                                                             105 IF (OFFSET .EQ. 0) 60 TO 106
IF (OFFSET .LT. 0) OFFSET = OFFSET + 1440
IF (OFFSET .GT. 720) 60 TO 89
Nührec = float(OFFSET * 60)/TIMREC
                                                                                                                                                                                                                                                                                                                                                         106 NURMNS = ENDMNS - BGNMNS
IF (NBRMNS .LE. 0) NBRMNS = NBRMNS + 1440
PRINTS = (NBRMNS * 60)/INTVLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               DECODE (16,1110,1NBUF(1)) (DATA(1),1=1,8)
                                                                                                                                                                                                                                                     READ (1,1010) INBUF(1), INRUF(2), MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                     READ (1,1010) INBUF(1), INBUF(2), MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               READ (1.1010) INBUF(1), INBUF(2), MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      INITIALIZE ARRAYS AND COUNTERS
 B-3 continued
                                                                                                                                                                                                                                                                                                                                                                                                              IF (MODE .EQ. 9) 60 10 7
IF (MODE .L1. 9) 60 10 86
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       S
                                                                             = RGNMNS - UATAST
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    6 IF (MODE .NE. 9) 60 TO
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    PRVTIM(1) = PRSTIM(1)
PHVTIM(2) = PRSTIM(2)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       IF (GOTREC) GO TO 9
                                                                                                                                                                                                                                                                                                                                                                                                                                                   DUMREC = DUMREC + 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            READ AND DECODE DATA
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8 NUMREC = NUMREC + 1
                                                                                                                                                                                                                                                                        IF (EOF(1)) 89.130
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   00 142 I=1,1024
                                                                                                                                                                                                                                     D0 130 I=1,NBRREC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  HISTO(J, I) = 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                IF (E0F(1)) 19,9
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   (EOF(1)) 86.6
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               00 141 K=1,13
                                             NEWTIM = .FALSE.
PRSMNS = BGNMNS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        GUTREC = . TRUE.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                LE(K,J) = 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           SXFRTH(J) = 0.
SXSQRS(J) = 0.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             D0 140 J=1.8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     (3882)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         NUMREC = 0
Figure
                                                                                                                                                                                                                                                                                            130 CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     140 CONTINUE
                                                                             OFFSET
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     1110 FURMAT
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B-13

Figure B-3 continued

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SIGNIFICANT 9 BITS TO PROVIDE AN
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          2300 FORMAT (/.1H0.15X, "DATA SUMMARY FOR THE TIME PERIOD BEGINNING ".
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           E(J) = (1./(FLTN * (XRMS(J) ** 4.)) * SXFRTH(J) - 1) ** 1./4.
CALL LVALUE (HISTO,XCOR.LE.LL.FLTN,J.LINEAR)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PRCENT
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              * XSQRD)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        5
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     IF (PRSTIM(1) .66. 24) PRSTIM(1) = PRSTIM(1) -
PRCENT = (FLOAT(NUMREC)/FLOAT(INTREC)) * 100.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        BEGIN SUMMARIZING DATA FOR SPECIFIED INTERVAL
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  X50RD = (8. * (FL0AT(I-1) + .5)) ** 2
SX50RS(J) = SX50RS(J) + FLTHST * X50RD
SXFRTH(J) = SXFRTH(J) + FLTHST * (X50RD
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           PRINT THE RESULTS FOR THE SPECIFIED INTERVAL
                                                                                                                                                                                                                                                                                                                      KEAD (1,1010) INBUF(1), INBUF(2), MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF (HISTO(J,I) .EQ. 0) GO TO 175
                                                                                 HISTO(J, INDEX) = HISTO(J, INDEX) + I
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    ------
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          CALL PAGER (LINE, PAGE, LINFAC, MNTHS)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               PRSTIM(1) = PRSTIM(1) + INTRVL(1)
PRSTIM(2) = PRSTIM(2) + INTRVL(2)
                                                                                                                                                                                                                                                                                                                                                                                                        30
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          IF (PRSTIM(2) .LT. 60) 60 T0 18
   MASK AND SHIFI DATA TO THE MOST
INDEX INTO THE HISTOGRAM ARRAY
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       XRMS(J) = SOHT(SXSORS(J)/FLIN)
                                                                                                                                                                                                                                                                                                                                                                                  SUMREC = NUMREC + DUMREC
IF (SUMREC +LT, INTREC) 60 TO
DUMREC = SUMREC - INTREC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      ISEC1 = PRVTIM(2) - IMINI*10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               ISEC2 = PRSTIM(2) - IMIN2*10
                                                                                                                                                  IF (J .6E. CHANLS) 60 TO 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            PKSIIM(2) = PRSIIM(2) - 60PKSIIM(1) = PRSIIM(1) + 1
                                                                                                                                                                                                                                                         16 IF (MODE .LT. 9) 60 T0 195
DUMREC = UUMREC + 20
D0 160 I=1,19
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        N = B & NUMREC / CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 FLTHST = HISTO(J,I)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |M|N2 = PRST|M(2)/10
                                                                                                                                 IF (I .6E. 8) 60 T0 8
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             IMINI = PRVTIM(2)/10
                                                                   INUEX = DATA(I)/8 + I
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LINFAC = CHANLS + 6
                                                                                                                                                                                                                IGNORE DUMMY RECORDS
                                                                                                                                                                                                                                                                                                                                       IF (EOF(1)) 19,160
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     00 175 1=1,1024
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      DU 170 J=1.CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                    60TREC = .FALSE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             FLIN = FLOAT(N)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CONTINUE
                                                                                                                                                                        60 TO 11
                                                                                                                                                                                                                                                                                                                                                               CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       170 CONTINUE
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L 90 L 80 L 70 L 60 L 50
L 1 LE0 LEPS LSIG 1
                                                                                                                                                                             * 100 + HEADER(4) * 10 + HEADER(5)
* 100 + HEADER(7) * 10 + HEADER(8)
                                                                                                                                                                                                                                                                                                                                OF ANALYSIS; THEREFORE,
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          20 DE CODE (16.1100.INBUF(1)) (HEADER(1).I=1.16)
                                                                                                                                                                                                                                                                                                                                                                                                          INTRVL(2) = ((NUMREC + DUMREC) * TIMREC)/60
                                            []
                                                                                                                                                                                                                                                                                                                                                                                                                        INTRVL(1) = INTRVL(2)/60
INTRVL(2) = INTRVL(2) - (INTRVL(1) * 60)
INTREC = NUMREC + DUMREC
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         LINEAR(J) = .FALSE.
If (HEADER(9) .E0. 0) LINEAR(J) = .TRUE.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                UECODE AND FILL ARRAYS WITH HEADER INFO
                                                                                                                   LEG = 20. * ALOGIO(XRMS(J)) + XCOR(J)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           25 MNHDR(1) = HEADER(2) * 10 + HEADER(3)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALHLV(J) = FL0AT(CALHDR(J, 4))/100.
 95
92
                                                                                                                                                                                                                                                                                                                                END OF FILE ENCOUNTERED BEFORE END
                                                                                                                                                LSIG = (LE(1),J) - LE(7,J))/1.28
NPL = LEU + 2.56 * LSIG
                                                                                                                                                                                                                                                                                     ~
                                            ") • 2X • 5 ( "
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       JF (HEADER(1) .EQ. 2) GO TO 25
   بہ یہ
                                                                                                                                                                                                                                                                                     (NPRNIS .LT. PRINIS) 60 TO
 r 99
L 10
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              UECODE INFO FOR MAIN HEADER
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CALHOR(J,I) = HEADER(3)CALHOR(J,2) = HEADER(6)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            CALHDR(J,3) = HEADER(9)
                                                                                                                                                                                                                                                                                                                                               REPORT PARTIAL INTERVAL
                                                     ļ
 7.1H0.5X." CHANL
"L 40 L 30 L 20
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   RATE = RATES(RATE+1)
                                                                                                                                  LEPS = 8.686 * E(J)
                                                                                                                                                                                                                                         I + SINPRNIS = NPRNIS + 1
                                                                                                                                                                                                                                                                        (E0DATA) 60 T0 1
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     CHANLS = HEADER(36)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                CALHED(J) = .TRUE.
                                                   DU 190 J=1.CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 RATE = HEADER(15)
                                          /•111+•7X•14("_
                           •..INI
                                                                                                                                                                                                                                                                                                                                                                                            EODATA = .TRUE.
                                                                                                                                                                                                                                                        IF (E0FLG) ST0P
                                                                                         IF (LINEAR(J))
                                                                                                                                                                                                                                                                                                                                                                           EOFLG = .TRUE.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   J = HEADER(2)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        1100 FORMAT (16R1)
                                                                                                                                                                                                                           190 CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                   60 10 17
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* 100 + HEADER(15) * 10 + HEADER(16)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   INITIALIZE THE HISTOGRAM ARRAY AND THE STATISTICAL ARRAYS
                                                                                                                                                             FLUSH REMAINING RECURDS FROM HEADER OR DUMMY BLOCK
                                                 = HEADER(10) * 1000 + HEADER(11) * 100
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             SKIP CALIHRATION DATA FOR CHANNELS TO BE IGNORED
                                                                                                                                                                                                                                                                                                                         FLUSH DATA RECORDS UNTIL NEW HEADER IS FOUND
                                                                  HEADER(12) * 10 + HEADER(13)
                                                                                                                                                                                           DO 210 I=1.19
KEAD (1.1010) INBUF(1), INBUF(2), MODE
IF (EOF(1)) 88,210
                                                                                                                                                                                                                                                                                                                                                          READ (1,1010) INBUF(1), INBUF(2), MODE
* 10 + HEADER(5)
* 10 + HEADER(7)
                                 = HEADER(0) # 10 + HEADER(9)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              If (MODE .LT. CALNUM) CALNUM = MODE
MODESV = MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              IF (CHANLS .LE. 0) 60 T0 81
IF (MODE .61. CHANLS) 60 T0 84
                                                                                                                                                                                                                                                                                                                                                                                              27
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             30 IF (MODE .61. 9) 60 TO 26
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  IF (J .LT. MODE) GO TO 32
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     XSQRD = DATA(I) = DATA(I)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      PROCESS CALIBRATION DATA
                                                                                                                                                                                                                                                                                                                                                                                           28 IF (M0DE .6E. 9) G0 T0
IF (M0DE .6E. 1) G0 T0
G0 T0 20
                                                                                      \mathsf{MNHDR}(6) = \mathsf{HEADER}(14)
= HEADER(4)
= HEADER(6)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       DO 300 J=MODE, CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           00 310 I=1,1024
HIST0(J,I) = 0
                                                                                                                                                                                                                                                                                                                                                                             IF (EOF(1)) 88,28
                                                                                                                                                                                                                                                                  GOTREC = .FALSE.
GO TO 3
                                                                                                     MAINHD = .TRUE.
                                                                                                                          NEWTIM = . TRUE.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SXFRTH(J) = 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          SXSORS(J) = 0
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               CONT INUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        0
HNHDR (2)
MNHDR (3)
                                                   MNHDR (5)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     NUMREC =
                                                                                                                                                                                                                                               210 CONTINUE
                                    ( 7) HUHNN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        60 10 38
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          + L = L
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 300 CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             +
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CALBTM(J) = N/10
EPSCAL(J) = SORT(SXSORS(J)/FLTN)
ELEPS(J) = (1./(FLTN * (EPSCAL(J) ** 4.)) * SXFRTH(J) - 1) ** 1./4.
ELEPS(J) = ELEPS(J) * 0.686
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      :
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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              DATA ENCOUNTERED BEFORE MAIN
SIGNIFICANT 9 BITS TO PROVIDE AN
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         CALIBRATION HEADERS MISSING
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      NO HEADER FOUND FOR CHANNEL
                                                                                                                                                                                                                                                                                                                                                                                                                                                        CALL LVALUE (HISTO,XCOR,LECAL,LL,FLTN,J,LINEAR)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          "OR CHANNEL SELECTOR SWITCH SET TO ZERO")
                                                                                                                                                                                                      DECODE (16,1110,1NBUF(1)) (DATA(L),L=1,8)
NUMREC = NUMREC + 1
                                                                                                                                                     KEAD (1,1010) INBUF(1), INBUF(2), MODE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 READ (1,1010) INBUF(1), INBUF(2), MODE
IF (EOF(1)) 88,430
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  82 WRITE (6,8200) I
8200 FORMAT (140,5X,"--- FATAL EKROR ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              8000 FURMAT (1H0,5X,"--- FATAL ERROR ---
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      BIOD FORMAT (1H0+5X,"--- FATAL ERROR ---
                                                                          HISTO(J,INDEX) = HISTO(J,INDEX) +
   MASK AND SHIFT DATA TO THE MDST
INDEX [NTO THE HISTOGRAM ARRAY
                                                                                                                                                                                        IF (MODESV .NE. MODE) 60 T0 40
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            DISCARD CALIBRATION ERROR BLOCK
                                                                                                                                                                                                                                                                                                                       CALCULATE CALIBRATION VALUES
                                                                                                                                                                                                                                                              IF (J .GE. CHANLS) 60 TO 31
60 TO 32
                                                                                                                                                                                                                                                                                                                                                               5
                                                                                                                                                                                                                                                                                                                                                             IF (MODE .61. 9) 60 10
N = 8 * NUMREC/CHANLS
                                                                                                                                                                                                                                                                                                                                                                                                  FLIN = FLOAT(N)
D0 400 J=M0DESV,CHANLS
                                                                                                                 IF (1 .LT. 8) 60 TO 39
                                                         INDEX = DATA(I)/8 + 1
                                                                                                                                                                      IF (EOF(1)) 88.37
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       BI WRITE (6+8100)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            80 WRITE (6,8000)
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               00 430 I=1.19
                                                                                                                                                                                                                                                                                                                                                                                                                                         XCOR(J) = 0.
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               -HEADERS")
                                                                                                                                                                                                                                                  60 TO 31
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    CONTINUE
                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       430 CONTINUE
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DRMAT (1H0.5X."--- FATAL ERRUR --- ANALYSIS PERIOD INCONSISTANT" ." WITH DATA AQUISITION TIME FOR SPECIFIED HEADER") 8900 FORMAT(1H0,5X,"--- FATAL ERROR --- ANALYSIS PERIOD BEGINNING TIME - EXCEEDS DATA LENGTH OR REQUIRES AN OFFSET OF MORE THAN 12 HOURS") 2001 FORMAT (13X, A10, 12, 2X, 12, ":", 211," ANALYSIS BEGINNING AT ", 12, ":", INTEGER PAGE, MUTHS(12), BGNTIM(3), ENDTIM(3), INTRVL(2), TITLE(B) RMAT (1H0.5X,"~~~ FATAL ERROR ~~~ FILE WITH HEADER OF MONTH = .12," DAY = ".I2," HOUR = ".I2," COULD NOT BE FOUND") CHANNEL 1 THROUGH CHANNEL", IZ, A CALIBRATION MODE NUMBER", 12, ZII," AND ENDING AT ",IZ,":",ZII," USING INTERVALS OF "IZ, " HOURS AND ",IZ," MINUTES",//) WRITE (6.2001) MNTHS(MONTH), DAY, HOUR, MINI, BGNTIM, ENDTIM, CONTROL CARDS MISSING") /HEADNG/ MONTH, DAY, BGNTIM, ENDTIM, INTRVL, TITLE " HAS BEEN ENCOUNTERED WITH A CHANNEL SETTING OF ", I2) SUBROUTINE TO CALCULATE L VALUES FROM LI THROUGH L99 SUBROUTINE LVALUE (HISTO,XCOR,LE,LL,FLIN,J,LINEAR) SUBROUTINE TO PROVIDE PAGE CONTROL FOR LISTINGS SUBROUTINE PAGER (LINE, PAGE, LINFAC, MNTHS) 2000 F ORMAT (1H1,25X,8A10,15X,5HPAGE ,12,//) WRITE (6.2000) (TITLE(I),I=1.0), PAGE INTEGER CUMUL, CUMLSI, HISTO(0,1024) 8600 FORMAT (1H0,5X,"--- FAIAL ERROR ---8800 FURMAT (1H0,5X,"--- FATAL ERROR ---BTOU FURMAT (1H0,5X,"--- FATAL ERROR ---XCOR(8), LL(13), LE(13,8) WRITE (6,8300) CALNUM 8300 FORMAT (140,4--- FATAL ERROR ---8400 FORMAT (1H0,5X,"--- WARNING ---" HAVE NOT BEEN CALIBRATED") 88 WRITE (6,8800) MONTH, DAY, HOUR 84 WRITE (6+8400) MODE . CHANLS B-3 continued LINE = LINE + LINFAC IF (LINE -LE. 56) RETURN .HOUR, MINI **B3 CALNUM = CALNUM - 1** • MINI(2) L INEAR (8) LINE = LINFAC + 6 LK = [L(K) * FLIN]PAGE = PAGE + 186 WRITE (6,8600) INTRVL 87 WRITE (6,8700) H9 WRITE (6,8900) 60 10 26 CUMUL = 0Figure LOGICAL COMMON **HE TURN** S10P ж н Х 510P S10P 510P 90 STOP REAL END ENU 1 ŧ

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COMUL = CUMUL + HISTOLJ.I)

DU 100 I×1,1024

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CUMLSI = CUMUL

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CALCULATE LE VALUES USING A LINEAR INTERPOLATION BETWEEN ADJACENT VALUES.
                                                         XEKJ = .5 + (FLOAT(I-1) + FLOAT(LK-CUMLSI)/FLOAT(CUMUL-CUMLSI))
LE(K,J) = XEKJ * 8.
IF (.NOT. LINEAR(J)) LE(K,J) = 20. * ALOGIO(LE(K,J)) + XCOR(J)
                                                                                                                             K = K • 1
IF (K • GT. 13) RETURN
LK = LL(K) • FLIN
60 T0 75
RETURN
RETURN
LND
                                                                                                                                                                                                  100
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APPENDIX C

USE OF LINEAR FORMAT

It has already been noted that a 1 must be inserted on display switch #9 when entering the #1 header, if a decibel format is to be used. All of the preceding examples have assumed that acoustical data are being processed and that a decibel format is required.

Figure C-l and C-2 show the results of processing identical datafirst by the decibel format, then by the linear format. Note that the words 'DECIBELS' and 'LINEAR', respectively, appear in the first tables of the output listings.

Definitions of both linear and decibel formats are given in the main text under the heading ANALYTICAL RESULTS. The linear format was included so that variables such as wind speed or temperature could be recorded, and so that the system could have nonacoustical uses. Since the output is in fixed decimal form, care must be exercised to keep data withing the range XXX.XX. Although the examples show both channels in either decibel or linear format, the selection can be made by individual channels. Thus there could be two channels with acoustical data in decibel format, a third with temperature data in linear format, and a fourth with wind speed data also in linear format.

	INTERSTATE 1495 NOTSE STUDY - BRIDGE DATA 1976 (TAPE VHRCOB) PAGE 1	CALIBRATION TEST FUR CHANNEL 1 THROUGH CHANNEL 2 SENSOR LE SENSOR LE SENSOR LE CHANNEL LOCATION TEST DURATION SENSOR TEST DURATION CHANNEL LOCATION LEC CALIBRATION LEVEL CORRECTION FACTOR TEST DURATION SECONDS TA-00 LOP TA-00 LOP TA-00 TA-00 <th colspa="2" t<="" ta-00"<="" th=""><th>THE FOLLOWING ANE UNCORRECTED L VALUES FOR THE CALIGHATION HUNS CHANL L_92 L_92 L_92 L_92 L_92 L_92 L_92 L_10 L_1 1 54.8 54.8 54.8 54.9 <</th><th>DATA SUMMARY FOR THE TIME PERIOD REGINNING 18:30 AND ENDING 18:50 BASED ON 100. PERCENT USABLE DATA DATA SUMMARY FOR THE TIME PERIOD REGINNING 18:30 AND ENDING 18:50 BASED ON 100. PERCENT USABLE DATA VL L 22 L 22 L 20 L 02 L 12 L 50 L 30 L 30 L 20 L 10 L 5 L L L L L 0 L L 2 L 1 L E0 L L 10 L 10 65.6 67.2 68.9 70.4 71.3 72.0 72.6 73.2 73.9 74.9 76.5 78.0 82.7 74.2 4.3 3.1 82.0 69.5 54.7 56.3 57.2 58.6 59.7 61.0 62.2 63.5 64.9 66.2 68.0 69.3 72.1 64.4 2.9 4.5 75.9 70.2</th><th></th><th>Figure C-1. Data output listing from program "ANOISE" - decibel format.</th></th>	<th>THE FOLLOWING ANE UNCORRECTED L VALUES FOR THE CALIGHATION HUNS CHANL L_92 L_92 L_92 L_92 L_92 L_92 L_92 L_10 L_1 1 54.8 54.8 54.8 54.9 <</th> <th>DATA SUMMARY FOR THE TIME PERIOD REGINNING 18:30 AND ENDING 18:50 BASED ON 100. PERCENT USABLE DATA DATA SUMMARY FOR THE TIME PERIOD REGINNING 18:30 AND ENDING 18:50 BASED ON 100. PERCENT USABLE DATA VL L 22 L 22 L 20 L 02 L 12 L 50 L 30 L 30 L 20 L 10 L 5 L L L L L 0 L L 2 L 1 L E0 L L 10 L 10 65.6 67.2 68.9 70.4 71.3 72.0 72.6 73.2 73.9 74.9 76.5 78.0 82.7 74.2 4.3 3.1 82.0 69.5 54.7 56.3 57.2 58.6 59.7 61.0 62.2 63.5 64.9 66.2 68.0 69.3 72.1 64.4 2.9 4.5 75.9 70.2</th> <th></th> <th>Figure C-1. Data output listing from program "ANOISE" - decibel format.</th>	THE FOLLOWING ANE UNCORRECTED L VALUES FOR THE CALIGHATION HUNS CHANL L_92 L_92 L_92 L_92 L_92 L_92 L_92 L_10 L_1 1 54.8 54.8 54.8 54.9 <	DATA SUMMARY FOR THE TIME PERIOD REGINNING 18:30 AND ENDING 18:50 BASED ON 100. PERCENT USABLE DATA DATA SUMMARY FOR THE TIME PERIOD REGINNING 18:30 AND ENDING 18:50 BASED ON 100. PERCENT USABLE DATA VL L 22 L 22 L 20 L 02 L 12 L 50 L 30 L 30 L 20 L 10 L 5 L L L L L 0 L L 2 L 1 L E0 L L 10 L 10 65.6 67.2 68.9 70.4 71.3 72.0 72.6 73.2 73.9 74.9 76.5 78.0 82.7 74.2 4.3 3.1 82.0 69.5 54.7 56.3 57.2 58.6 59.7 61.0 62.2 63.5 64.9 66.2 68.0 69.3 72.1 64.4 2.9 4.5 75.9 70.2		Figure C-1. Data output listing from program "ANOISE" - decibel format.
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			1783
JUNE 14 18:25 ANALYSIS BEGINNING AT 18:30 ANU ENDING AT 18:50 USING INTERVALS OF 0 HOURS AND 20 MINUTES CALIBRATION TEST FOR CHANNEL 1 THROUGH CHANNEL 2	SENSOR LE LE	DATA FOR PHOJECT NO. 1197 JUB NO. 908 WAS GATHERED AT SITE NO. 1 USING 2 CHANNELS AT A MATE OF 5 SAMPLES/SECOND DATA SUMMARY FOR THE TIME PERIOD BEGINNING 18:30 AND ENDING 19:50 BASED ON 100. PERCENT USABLE DATA 1 29 L 90 L 10 L 40 L 11 L L L L L 12 L 10 L 1516 MPL 1 29:19 20:91 61:45 73:56 H2:37 90.74 116.78 200:36 75:55 50 2 21:94 20:43 39:07 45:27 60:75 70:57 62:96 67:45 73:56 H2:06 118:04 165:18 .31	Figure C-2. Data output listing from program ANOISE - linear format.

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