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AIRPORT-NOISE LEVELS AND ANNOYANCE MODEL SYSTEM'S REFERENCE MANUAL

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1.0 INTRODUCTION

The purpose of this document is to describe the Airport-noise Levels and Annoyance MOdel (ALAMO) in terms of a detailed description of the constituent modules, to describe the execution of ALAMO procedure files, necessary for system execution, and to present the source code documentation associated with code development at Langley Research Center. The modules constituting ALAMO are presented both in flow graph form, and through a description of the subroutines and functions that comprise them.

2.0 SYSTEM DESCRIPTION

The Airport-noise Levels and Annoyance MOdel (ALAMO) is a system of five processor modules which when executed in sequence evaluate the effect of aircraft noise on a surrounding airport community. The five processors contained in the baseline ALAMO system are: the Integrated Noise Model, the Contour Processor, the SITE II Phase 1 Processor, the SITE II Phase 2 Processor and the Report Generator. These processors use, in addition to the INM and SITE II databases, ten user named files to produce noise exposure and impact reports, as well as noise impacted population distribution plots overlaid on an octant line compass rose. These files are named as follows in the ALAMO submit file: XXX is the Airport Auxiliary file and is input to the Contour Processor and the Report Generator; XXX001 is Airport Description Data and is input to the Integrated Noise Model; XXX002 contains airport statistics generated from the Integrated Noise Model; XXX003 is noise contour data generated from the Integrated Noise Model to serve as input to the Contour Processor; XXX004 is the SITE II Phase 1 input file generated from the Contour Processor; XXX005 is the plot vector file generated in the Contour Processor; XXX006 is used as a temporary accumulator for the output generated from both the SITE II Phase 1 and Phase 2 processors; XXX007 contains the complete output from both Phase 1 and Phase 2, and serves as input to the Report Generator; XXX008 contains the Noise Impact Summary Report tabulated by the Report Generator; XXXR contains the Noise Impact Summary Report associated with a countermeasure case executed subsequent to the baseline case.

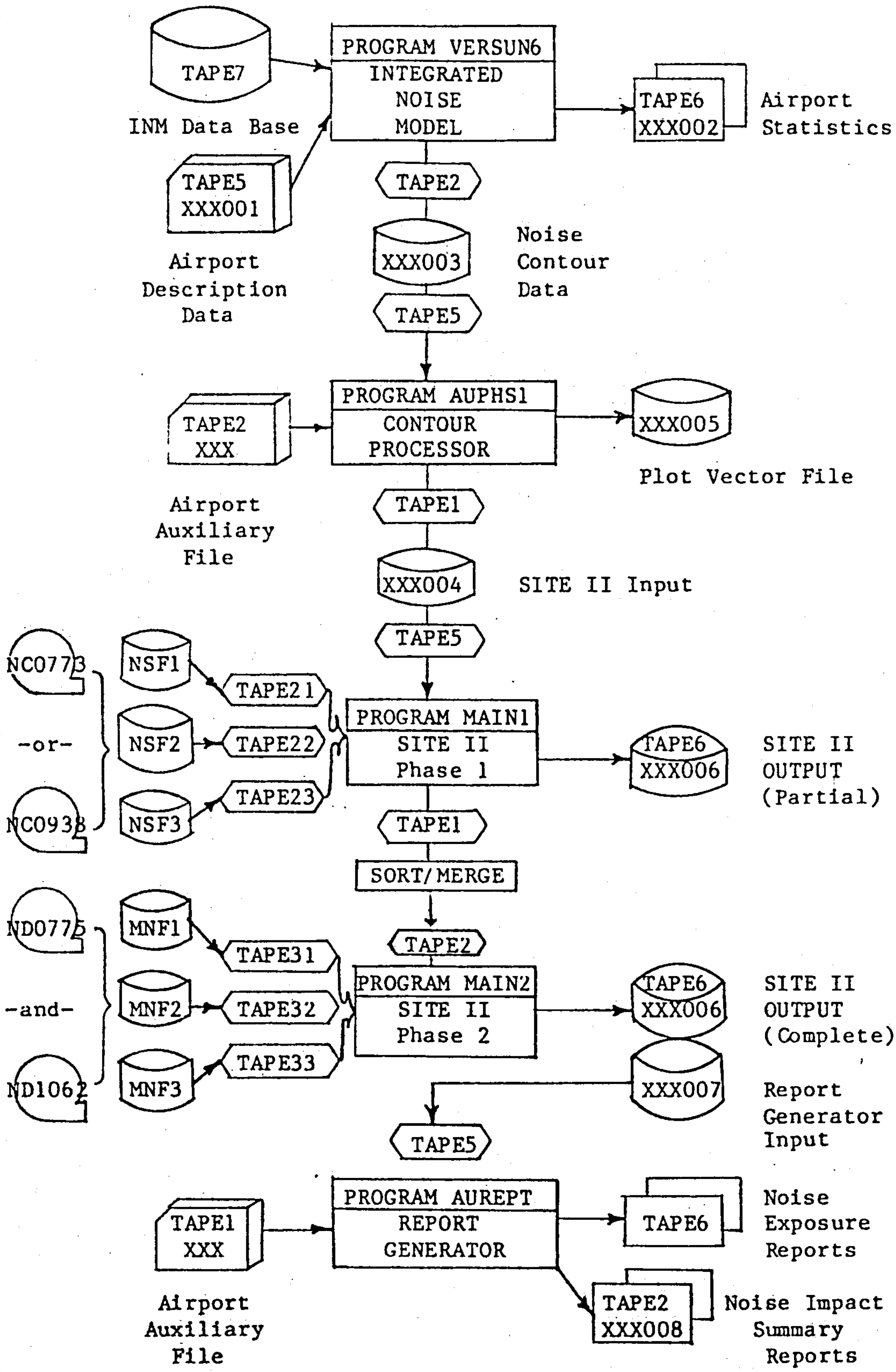

Figure 1.-Baseline System Job Flow.

The logical unit numbers assigned by a particular processor is illustrated in figure 1. The integrated Noise Model (INM) Processor reads as input the INM database and Airport Description Data. The INM database contains standard information on aircraft noise and performance for commercial, general aviation, and military aircraft. The Airport Description Data (named file XXX001) contains runway, track, approach profile and traffic mix data for any particular airport. The INM Processor reads these files, generates an airport statistics file (named file XXX002), and computes noise contour data for noise levels 65 to 85 decibels. The noise contour data file (named file XXX003) is then input to the Contour Processor.

The Contour Processor reads, in addition to the contour data file, the Airport Auxiliary File (named file XXX). This file contains the latitude, longitude, displacement and translation values, and a user designated population growth rate for a given airport. The Contour Processor then generates noise footprint contour plots and writes them to the plot vector file (named file XXX005), and computes a sequential file (named file XXX004) containing noise contour coordinates which is input to the SITE II Phase 1 Processor.

The SITE II Phase 1 Processor reads, in addition to noise contour coordinates the SITE II database. The SITE II database is contained on magnetic tape and can be accessed from the volume serial numbers ND0775, ND1062, NC0773 and NC0938, respectively. The census data for the states Alabama through Mississippi (in alphabetical order) are contained on tape number ND0775; the census data for the states Missouri through Wyoming are contained on tape number ND1062; the block group data which describes a physical area surrounding a landmark is contained on tape number NC0773; and the census tract data is contained on tape number NC0938. The zipcode data contained on tape number NC0753 may be optionally processed. The data is retrieved (see fig. 8) before SITE II processing and written to the direct access file NSF1, NSF2 and NSF3 to be input to the Phase 1 processor via the logical files TAPE21, TAPE22 and TAPE23. Tape number NC0773 or NC0938 is selected for retrieval depending on whether the user wants to process block groups or census tract data. The census data for each state is retrieved from tape numbers ND0775 and ND1062 and copied to the direct access files MNF1, MNF2 and MNF3 to be input to the Phase 2 processor via the logical files TAPE31, TAPE32 and TAPE33. The census information retrieved is demographic and housing data obtained from the 1980 census, updated to 1981; additional census data was obtained from the 1970 census. The Phase 1 Processor selects records containing population values that are within the noise level boundary computed in the Contour Processor.

The Phase 2 processor compiles the contour and demographic data, arranges it and writes it to a file (named file XXX006). The contents of the file XXX006 are transferred to the named file XXX007; this final file is input to the Report Generator.

The Report Generator reads the data file written in SITE II and the Airport Auxiliary File (named file XXX). Ten reports are generated, the first eight reports contain noise exposure correlations for each octant in the compass rose; the ninth report contains demographic noise exposure values and the tenth report (written on the named file XXX008) is the Noise Impact Summary Report.

3.0 MODULE DESCRIPTION

The baseline ALAMO system was assembled by linking four major subsystems together to comprehensively assess the noise impact on various airport communities. The system is a combination of software developed by outside interest, and software developed here at Langley Research Center (LaRC) to augment ALAMO for use on the Network Operation System (NOS). The Integrated Noise Model (INM), which computes noise exposure values, was developed by the Federal Aviation Administration; the Contour Plot Processor, which plots the contour noise footprints and generates contour descriptions in SITE II format, was developed at LaRC by Computer Sciences Corporation (CSC); the SITE II demographic program, which provides access to the United States Census database, was developed by CACI, Inc.; and the Report Program, which generates noise impact statistics was developed at LaRC by CSC. The following four sections describe the logic flow of each subsystem program illustrated by a tree diagram of source modules.

3.1 INTEGRATED NOISE MODEL

The Integrated Noise Model program VERSUN6 is logically divided into four distinct areas of code as illustrated in figure 2, input, processing, output and general utility routines. The Airport Description Data Deck and the INM database are the input files to VERSUN6. The Airport Description Data Deck is read from logical unit 7 in subroutine READIN. Since Fortran input/output routines add the characters TAPE as a prefix to the logical unit to form the file name, TAPE7 is the file name assigned to logical unit 7. From this point on all of the logical units will be referred to by their file names.

Input

Refer to the input area of routines in figure 2. Runway and track data are read in subroutine RWYRD, track data is input beginning at entry point TRAKRD in RWYRD. Subroutine HELG is referenced by RWYRD to compute circular segment variables. Aircraft approach parameters, altitude data, wind information and noise parameters are read in subroutines APPTRD, ALTRRD, WINDRD and NOISRD respectively. Aircraft performance profiles are read in and stored in subroutine PROFD. The aircraft takeoff performance parameters are corrected by airport altitude and ambient temperature in subroutine TPROF. User defined replacement values for the tolerances used for checking

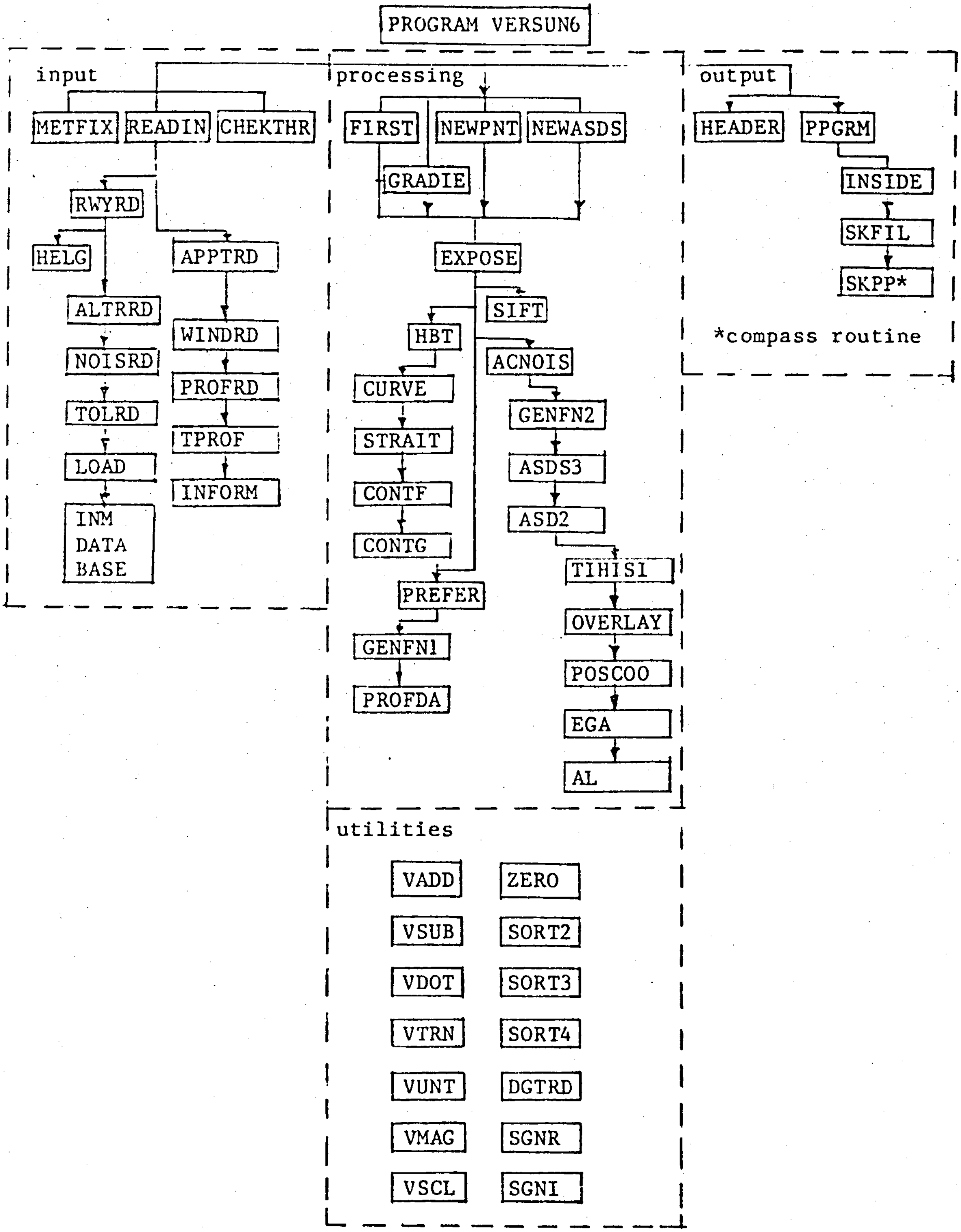

Figure 2.-Integrated Noise Model Flow

contour looping conditions are read in subroutine TOLRD. The aircraft mix data describing the type, magnitude and arrangement of aircraft activity at an airport is read in subroutine MIXRD. Refer to the Integrated Noise Model Version 2 User's Guide (Section 2) for a detailed description of the Airport Description Data Deck. The INM database contains aircraft noise and performance data for each aircraft type. If the user decides to enter new aircraft definitions a call is made to subroutine LOAD to read the INM database. In the event that this occurs, a call is made to subroutine INFORM to inform anyone reading the output that the user has modified the aircraft data in the database or has created his/her own aircraft definitions.

A call is made to subroutine METFIX to initialize the noise metric variables. The metric identification (NEF, LDN, CNEL, LEQ, ASDS or DOSE) is read from the second record in The Airport Description Data Deck. A call is also made to subroutine CHEKTHR to compare the thrust noise settings in the database. This call is made if the user has opted to modify the database.

3.1.2 Processing

Each noise level contour is processed point by point. Initially subroutine FIRST is called from VERSUN6 to take the first guess at the new contour point position. A call is made to subroutine GRADIE which computes the new point by determining the gradient. If the first point has been computed subroutine NEWPNT is called to compute the next contour point. If the metrics NEF, LDN, CNEL or LEQ are used then NEWPNT is referenced, if the metrics ASDS or DOSE are used then a call is made to subroutine NEWASDS to compute the next contour point. After the position of each point is computed a call is made to subroutine EXPOSE to calculate the noise exposure value at that point. The first call in EXPOSE is made to subroutine SIFT to determine which flights create a significant contribution to the overall noise exposure level. Noise exposure correction values for track geometry are computed in subroutine HBT. The shortest distance from a contour point to a ground track segment are computed to determine the correction values. The distance to curved and straight segments are computed in subroutines CURVE and STRAIT respectively. The corrections are then computed for curved segments in the function CONTF and for straight segments in the function CONTG. For comparison purposes a call is made to subroutine ACNOIS to compute the noise exposure level for one single flight from any combination of metrics. To determine the noise exposure levels for the ASDS and DOSE metrics calls are made to subroutines ASD2 and ASD3 respectively. For the ASDS metric a call is made to the time history routine TIHISI to determine the times that the selected threshold noise levels are exceeded by one flight. Subroutine OVERLAY is referenced to overlay the flight performance profile over the ground track segments. The aircraft position coordinates, the ground attenuation and the noise level at a point is computed in subroutines PSCOO, EGA and AL respectively.

3.1.3 Output

The output area of the code writes two files for output, the Airport Statistics file on TAPE6 and the Noise Contour Data file on TAPE2. Subroutine HEADER prints the column headers for the contour information. The formats for PLINE, which is an entry point in HEADER, are also set up. The actual contour points and values are printed a line at a time at the entry point PLINE. The Noise Contour Data file is written to TAPE2 (named file XXX003) in subroutine TPGRM. Subroutine INSIDE is called to determine if point is within the defined contour or not, if not, that point is not written to the output file. Subroutine SKFIL is called to skip pass the end of file mark to start a new file. The entry points SKPPFF skip forward one file or skip backwards one file.

3.1.4 Utilities

The system utilities are subroutines and function subprograms that are used to perform routine vector, sort and arithmetic operations. Vector operations such as addition, subtraction, dot product, vector to vector transfer, unit vector computations, vector magnitude computations and vector by scalar multiplication are performed by the functions VADD, VSUB, VDOT, VTRN, VUNT, VMAG and VSCL respectively. The subroutine ZERO is used to clear vectors. The sort utility SORT2 sorts three arrays of numerical data in ascending order. The entry point SORT3 in SORT2 sorts two arrays in ascending order. The subroutine SORT4 sorts numerical data from four arrays or tables in descending order. SORT4 is referenced from subroutine MIXRD to assemble the flight identification table and the associated equivalent operations for the noise metrics NEF, LDN,CNEL or LEQ. The degrees to radians conversion is performed by subroutine DGTRD; value normalization and sign determination are performed by the routines SGNR and SGNI respectively.

3.2 CONTOUR PROCESSOR

The contour processor program AUPHS1 converts the Noise Contour Data file (named file XXX003) generated in the INM processor, from x-y coordinate points to a set of polygons for each noise level. These polygons are in a format compatiable for input to the SITE II Phase 1 processor (see fig. 1). The subroutine INIT is called to read the Airport Auxiliary File (named file XXX) from TAPE2. This file contains the latitude, longitude, and optional north-south and east-west distances from the airport latitude and longitude. Axis translation data, axis length information and the airport title are also contained in the Airport Auxiliary File. Subroutine SYSTEM is called to issue error messages if the file doesn't process properly. The Noise Contour Data file on TAPE5 is read and evaluated to determine the number of records between the metric card and the x-y coordinate points. The header data and the x-y points for the noise contour are read from TAPE5 in subroutine RDCONTR and the axis translation is performed in subroutine TRNSLT (see fig. 3). The point reduction software is driven by subroutine SITE2. There is 150 point limit for each contour. Subroutine NEWCRV is called to delete all unnecessary points below a given maximum on a noise contour. The area of the new contour is then computed to make sure that there is no more than a one percent difference in area between the old contour and the new reduced point contour. The plot vector file is then initialized in subroutine PLOT if this is the first

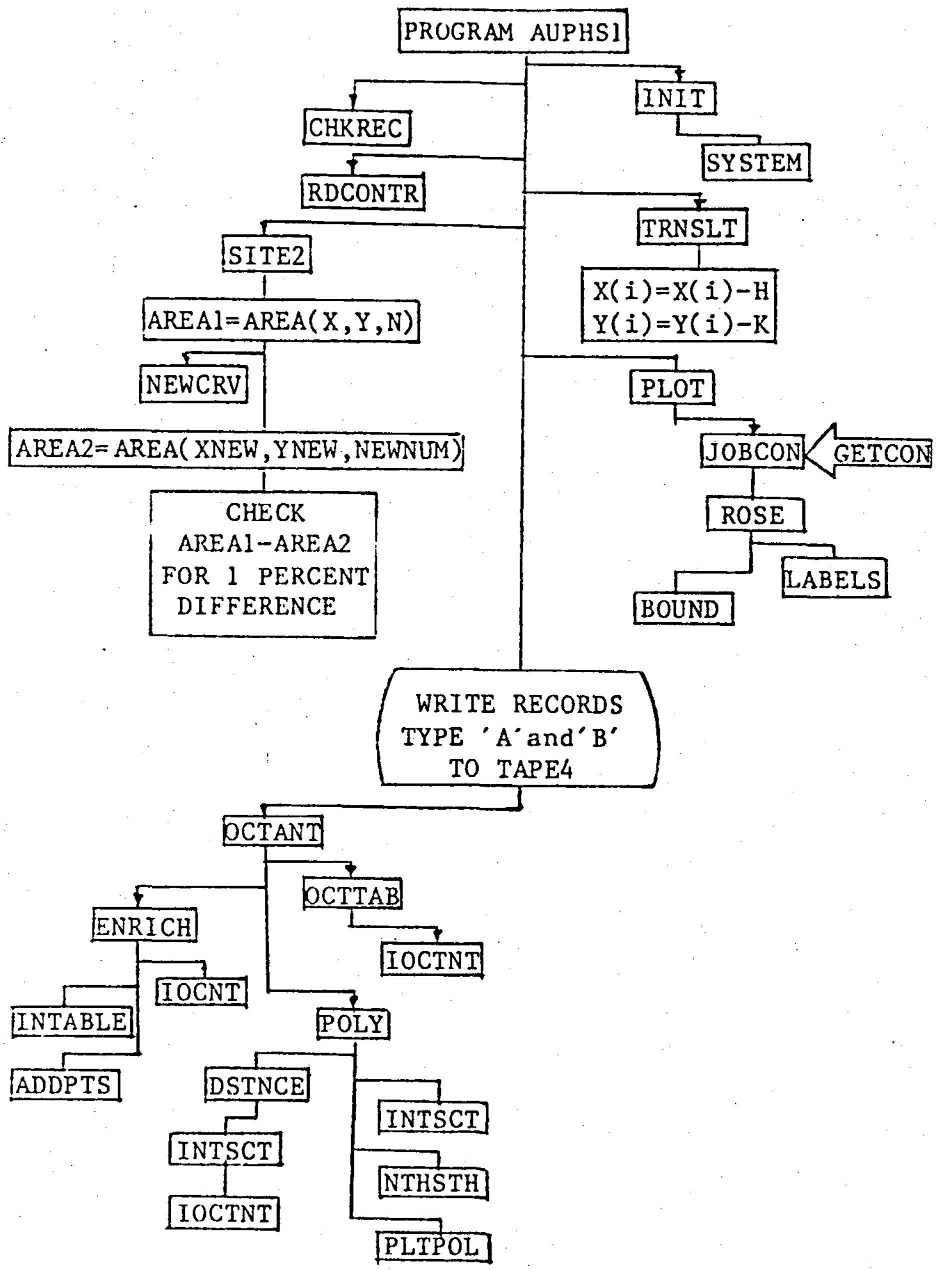

Figure 3.-Contour Processor Flow

contour processed. The entry point GETCON in the COMPASS routine JOBCON is referenced to sample job control register three. This is done to determine if this is a baseline case run. Plot information for the compass rose, plot boundaries and labels are written to the plot vector file in subroutine ROSE.

The SITE II input file contains four types of card images containing either the characters 'A', 'B', 'C', or 'D'. These characters indicate the following:

'A'	Run Identification
'B'	Site Identification
'C'	Case Identification
'D'	Case Identification Continuation

The reader is referred to the SITE II User's Manual, section IV for a detailed description of these card images. After the plot vector file is generated SITE II input file is written to TAPE4. The run number is written on card type 'A' and the airport name along with the airport latitude, longitude, the north-south displacement value and the east-west displacement value. The subroutine OCTANT is called to coordinate the polygon definitions. Subroutine OCTTAB is called from OCTANT to build a table of start and end points for each line segment in each octant. Subroutine IOCTNT is called from OCTTAB to determine which octant an x-y point lies in. After the start/end table is built a call is made to subroutine ENRICH if two are made to the functions INTABLE and IOCTNT to determine if the ordinal is in the start/end table and which octant the x-y point lies in, respectively. If two adjacent points that are not in the same octant are not in adjacent octants subroutine ADDPTS is called to add points. Subroutine POLY is then called from OCTANT to build polygons from the line segment table. Subroutine DSTNCE is called from POLY to find the distance from start/end points to the origin. Subroutine INTSCT is referenced from DSTNCE to compute the line equation for each segment, determine the octant of each point to find the octant line they straddle and to find the point of intersection on the octant line. Upon return to POLY 'C' type cards are written to TAPE4 containing the metric name, a table of LDN metrics and the area of the polygon in square miles. Subroutine NTHSTH is then called from POLY to convert x-y points from feet to statue miles and to write 'D' type cards containing there converted points to TAPE4. A final call is made to subroutine PLTPOL to plot the polygons given the x-y points and a scale factor. Execution control is then returned to program PHASE1. A final call is then made to BLDARR to extract information from the scratch unit TAPE4 and build the SITE II input file on TAPE1 (named file XXX004). If any deck contains more than 150 points then that deck is subdivided in this routine. Since each 'A' type card indicates the beginning of a new SITE II input deck an end-of-file mark is written to separate decks and the run counter is bumped.

3.3 SITE II DEMOGRAPHIC MODULES

There are two SITE II processor modules, the phase 1 program MAIN1 (see fig. 4) and the phase 2 program MAIN2 (see fig. 5). The phase 1 module reads the SITE II input file (named file XXX004) and generates an intermediate file of selected SITE II records for sorting. The phase 2 module reads the sorted file and generates the input file (named file XXX006). The information on XXX006 is aggregated on the named file XXX007, which serves as input to the Report Generator Module.

Phase 1

The phase 1 program MAIN1 initially calls subroutine INITAL to set default values for data item counts, maximum number of polygon points per run, population estimates, logical unit assignments, record length and block sizes for file structure. A call is then made to subroutine INPUT to read the SITE II input file (named file XXX004) and insure that there is a valid sequence of card types. Calls are initially made from INPUT to the subroutines WTCTRL and CDCBLK, to open the selected record file on TAPE1 and to encode hollerith blanks to blanks configured in "A" format, respectively.

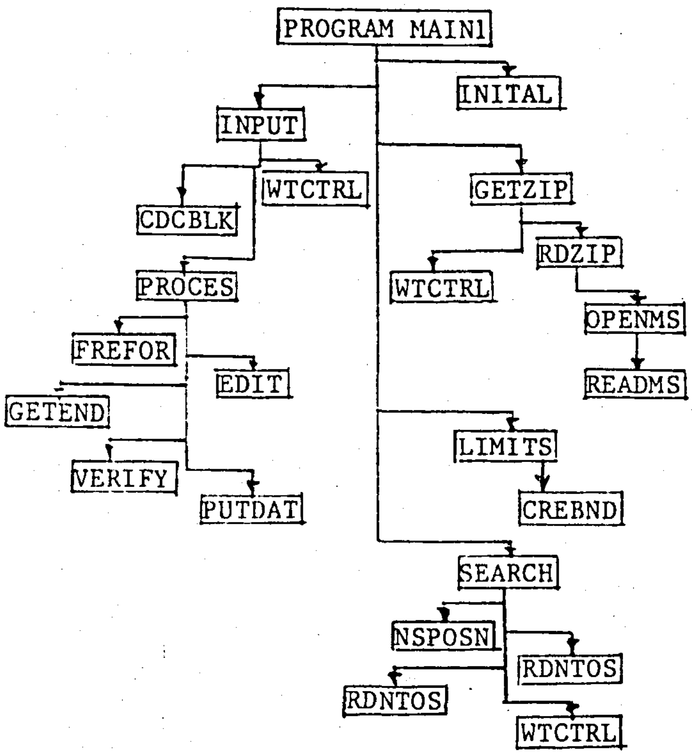

Figure 4.-SITE II Phase 1 Processor flow

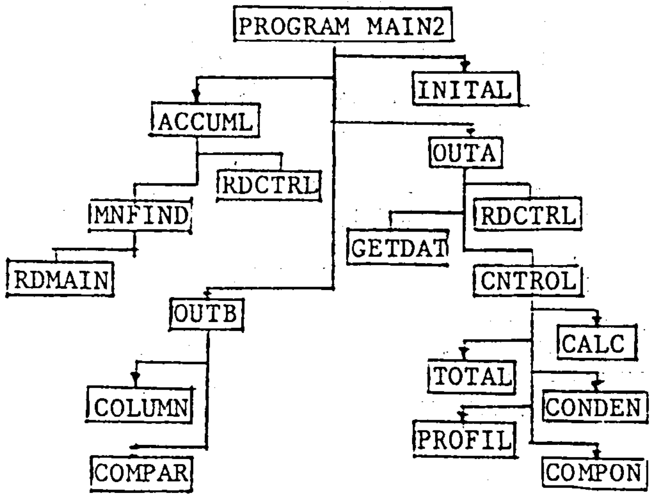

Figure 5.-SITE II Phase 2 Processor Flow

The SITE II input file is then read a record at atime and the first character on the record is checked for the card type. A call is then made to subroutine PROCES to define the structure for each card type. Calls are then made from PROCES to subroutines FREFOR and EDIT, to convert free form strings to fixed format card images and to edit each record to insure that each field has valid characters, respectively. Subroutine VERIFY is called to check specific data items in the SITE II input file. A call is then made to subroutine PUTDAT to create a sort key for the selected record file (TAPE1). Execution control is then passed back to subroutine INPUT to read another input record.

After the SITE II input has been read a call is made to subroutine GETZIP from MAIN1. This subroutine takes in array of requested zip codes and searches the zip file. For each zip found tract inclusion records are written to the selected record file on TAPE1. Subroutine RDZIP is called from GETZIP to open, read, rewind or close the zip file on TAPE1. A call is then made to subroutine LIMITS to find the latitude and longitude limits for each site and each run. Subroutine CREBND is referenced from LIMITS to convert sectors, chords and polygons to a form useable by subroutine SEARCH. Subroutine SEARCH reads the north/south records to determine the cases for which the record is a hit. For each hit a control record is written to TAPE1. Calls are made to subroutine NSPOSN, RDNTOS and NTCTRL, to get the first record below a given latitude, to get the next record and to write to the control file, respectively.

3.3.2 Phase 2

Before the phase 2 processor is invoked, the track inclusion control file written by the phase 2 processor on TAPE1 is sorted using the CDC utility SORTMRG. The sorted control file is written on TAPE2 for input to the phase 2 processor. Subroutine INITAL is referenced to initialize operational variables the same as the phase 1 processor. Subroutine ACCUML is then called to accumulate the area data for each case. Subroutine RDCTRL is called from ACCUML to read the control file which contains area information for each site. Subroutine MNFIND is called to read the main file. The file header is read to check for the state and to determine the number of records for that state. Upon return, ACCUML adds the percentage of area data to the total and writes the component area to TAPE3.

There are three levels of data on the SITE control file; level 1 is RUN data which is the population summation of all the areas formed around the sites under study; level 2 is SITE data, this is the reference point around which one or more boundaries are defined; and level 3 is CASE data which represents a physical area around the site. Subroutine OUTA controls the production of growth, profile and component area report data by referencing subroutine GETDAT to read the specified level of data from TAPE2. A call is then made to subroutine CNTROL to resolve specific requests for output. Calls made to COMPON to generate values for all the reports, accumulate data for SITE and RUN totals, to write summary report data in condensed form, to produce profile report data and to write component area report data, respectively to TAPE6 for input to the Report Generator. Upon return to MAIN2 a final call is made to subroutine OUTB to control the production of columnar and comparison reports data through calls to subroutine COLUMN and COMPAR. This data is also written to TAPE6 for input to the Report Generator.

3.4 REPORT GENERATOR

The SITE II report file (named file XXX007) generated following the SITE II phase 2 processor is input to the Report Generator on TAPE5. The Airport Auxiliary File (named file XXX) is also input on TAPE1 to the Report Generator program AUREPT (see fig. 6) to obtain the year of population, the population growth rate and the airport name and address. The SITE II case title is then read from the first record on the SITE II report file. The first call is made to subroutine BLDTAB to build a 3-dimensional table of sixteen demographic variables for each octant of each LDN band. The starting LDN index is defined by calling the entry point GETCON (in subroutine JOBCON) to fetch the job control register R3. A call is made to subroutine RDREPT to read the following demographic information from the SITE II report file:

- o Male and female age groups
- o Family income, home values and occupations
- o The number of single dwellings households
- o Households with T.V.'s and air-conditioners

This information is stored in the labelled common block /COMM/ and a return is made back to subroutine BLDTAB. Beginning at the LDN value determined from job control register R3, the 3-dimensional table is generated, stored in the array TABLE and passed back to REPORTS

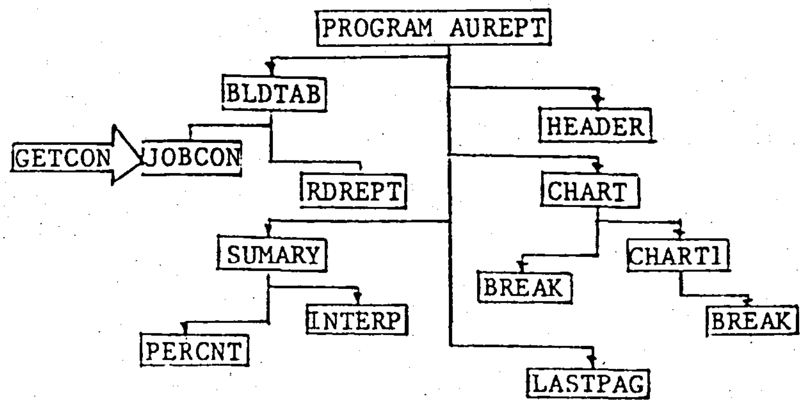

Figure 6.-Report Generator Flow

to print the heading for each octant. The TABLE array is checked for a void octant and a call is made to subroutine CHART. Subroutine CHART prints sixteen demographic variables by LDN band values and calls subroutine BREAK to transfer seven columns out of the 3-dimensional table to a vector array called LINE. An alternate call is made to subroutine CHART1 for special printing if an LDN contour is missing. A call is then made to subroutine SUMARY to print the Noise Impact Summary Report. The functions INTERP and PERCNT are referenced by SUMARY to compute the equivalent noise level value and the weighting factor for a given LDN value. Finally subroutine LASTPAG is referenced to write a separate Noise Impact Summary to TAPE2 (named file XXX008).

4.0 SYSTEM USAGE

The baseline ALAMO system can be used by submitting two submit files, the SITE II file retrival file SITEJOB and the baseline ALAMO execution submit file BASJOB. These submit files along with the procedure files they invoke will be described in the following sections to give an overview of the logic flow of the system.

4.1 SITE II DATABASE RETRIEVAL

The SITE II database resides on five magnetic tapes. These tapes are organized in the following manner:

Volume Serial No.	Tape Description
ND0775	State Code less than or equal to 28
ND1062	State Code greater than 28
NC0773	Physical area surrounding a landmark
NC0938	Census Tract Data
NC0753	Zip codes

The submit file illustrated in figure 7 is used to retrieve the SITE II database. The procedure file SETUP which resides on the permanent file SET is invoked by BEGIN statement. The state integer codes 17, 21 and 29, the state character codes IL, KY and MO along with the AREAS and ZIPS parameters are passed to the procedure file SETUP. In this example AREAS=1 indicates that the tape containing physical areas will be retrieved instead of the census tract data, ZIPS=0 indicates that the zip codes tape will not be retrieved. The procedure file SETUP is illustrated in figure 8. The parameters passed to SETUP through the PROC statement are as follows:

A = 17	E = KY
B = 21	F = MO
C = 29	G = 1
D = IL	H = 0

```
SUBFIL,T100,CM100000.                            DELIVERY INFO
USER,........
CHARGE,....,LRC.
GET,SET.
BEGIN,SETUP,SET,17,21,29,IL,KY,MO,1,0.
EXIT.

EDITING NOTES:
   - REPLACE INTEGER CODES 17, 21, AND 29 WITH THE
     APPROPRIATE INTEGER CODES FOR THE STATES OF
     INTEREST
   - REPLACE CHARACTER CODES IL, KY, AND MO WITH THE
     APPROPRIATE CHARACTER CODES FOR THE STATES OF
     INTEREST
```

Figure 7.-Submit File for SITE II Retrieval

```
.PROC,SETUP,A,B,C,D,E,F,G,H.
BEGIN,T,SET,A,A,ND0775,ND1062,D,MNF1.
BEGIN,T,SET,A,B,ND0775,ND1062,E,MNF2.
BEGIN,T,SET,B,C,ND0775,ND1062,F,MNF3.
RETURN,TAPE1,MNF1,MNF2,MNF3.
IFE,(G.NE.0),LABELA.
VSN,TAPE2=NC0773.
BEGIN,BT,SET,BLKGRP,D,NSF1.
BEGIN,BT,SET,BLKGRP,E,NSF2.
BEGIN,BT,SET,BLKGRP,F,NSF3.
SKIP(LABELB)
ENDIF,LABELA.
VSN,TAPE2=NC0938.
BEGIN,BT,SET,TRACKS,D,NSF1.
BEGIN,BT,SET,TRACKS,E,NSF2.
BEGIN,BT,SET,TRACKS,F,NSF3.
ENDIF,LABELB.
RETURN,TAPE2.
IFE,(H.EQ.1),LABELC.
VSN,TAPE3=NC0753.
LABEL,TAPE3,PO=R,SI=ZIPCDS,FI=ZIPALL.
COPYBF,TAPE3,ZIPF1.
REPLACE,ZIPF1.
ENDIF,LABELC.
REVERT. MYCCL SETUP
```

Figure 8.-SITE II Procedure File SETUP

Since at least three states from the database must be retrieved for an ALAMO run, the procedure file T is invoked three times as indicated by the three BEGIN,T,... statements. In the first statement the integer code 09 is passed twice through the A and B parameters and the state character code CT is passed through the D parameter. Since all of the database tapes are multi-file files containing a file per state, the D parameter is the file identifier (FI) parameters on the LABEL card. The procedure file T illustrated in figure 9 is invoked by the BEGIN statement and the A and B parameters are checked to determine which tape to load. If the state integer code is less than or equal to 28 then the tape with the volume serial number ND0775 is retrieved, if the integer code is greater than 28 then the tape numbered ND1062 is retrieved. The file containing data for the state of Connecticut (integer code 09, character code CT) is read from ND0775 and written to the direct access file MNF1; the file for the state of New Jersey (integer code 24, character code NJ) is read from ND0775 and written to the direct access file MNF2; and the New York file (integer code 26, character code NY) is read from ND0775 and written to the direct access file MNF3. The G parameter is checked to determine if the block group or the census track tape will be read. In this example G = 1 indicates that the block group tape (NC0773) will be retrieved. Notice that the IFE statement does not work like an IF statement. If the expression is true, the statements following the IFE are executed until an ELSE or ENDIF with a matching label is encountered. The procedure file BT (see fig. 10) is invoked three times to write block group data from the states, Connecticut, New Jersey and New York to the direct access files NSF1, NSF2 and NSF3.

```
.PROC,T,A,B,T1,T2,C,FF.
PURGE,FF/NA,ST=LPF.
DEFINE,FF.
IFE,(A.LE.28.AND.B.LE.28),LABELA.
LABEL,TAPE1,PO=R,VSN=T1,SI=MN1,FI=C.
SKIP,LABELD.
ENDIF,LABELA.
IFE,(A.GT.28.AND.B.GT.28),LABELB.
LABEL,TAPE1,PO=R,VSN=T2,SI=MN2,FI=C.
SKIP,LABELD.
ENDIF,LABELB.
RETURN,TAPE1.
IFE,(B.GT.28),LABELC.
LABEL,TAPE1,PO=R,VSN=T2,SI=MN2,FI=C.
SKIP,LABELD.
ENDIF,LABELC.
LABEL,TAPE1,PO=R,VSN=T1,SI=MN1,FI=C.
ENDIF,LABELD.
COPYBF,TAPE1,FF.
RETURN,FF.
REVERT. MYCCL T
```

Figure 9.-SITE II Procedure File T

```
.PROC,BT,SID,X,MN1.
PURGE,MN1/NA,ST=LPF.
DEFINE,MN1.
LABEL,TAPE2,SI=SID,FI=X,PO=R.
COPYBF,TAPE2,MN1.
RETURN,MN1.
REVERT. MYCCL BT
```

Figure 10.-SITE II Procedure File BT

The reader should note that the direct access files MNF1, MNF2, MNF3, NSF1, NSF2 and NSF3 must be created on the WFS cluster. The H parameter is checked to determine whether the zip codes tape (NC0753) is to be retrieved. If H = 1 then the tape file is written to the indirect access file ZIP1. After these files have been created a baseline ALAMO case can now be executed.

4.2 ALAMO JOB FLOW

To run a baseline ALAMO case the submit file BASJOB (see fig. 11) must be submitted. Due to the large amount of execution time required the user should submit BASJOB to a CYBER 175 (R or T) machine. The job control register R3 is set to zero indicating a baseline run.

4.2.1 Integrated Noise Model

The procedure file A1 is invoked using the BEGIN statement. There are 10 parameters naming the ALAMO system files. The XXX should be replaced with the F.A.A. airport identifier. The procedure file A1 illustrated in figure 12 describes each subsequent procedure file invoked and the parameters used. The direct access file CONTORA containing the absolutes for the INM processor program VERSUN6 is attached. The INM data base DATABIN is also attached and copied to TAPE7 for processing. The Airport Description Data file (named file XXX001) is loaded from the permanent file A. Figure 13 illustrates the execution of the INM processor. The local file A is the Airport Description Data file input to the INM processor CONTORA on TAPE5, the parameter B is the Airport Statistics file (named file XXX002) output from CONTORA on TAPE6 and the Noise Contour Data file (named file XXX003) generated on TAPE2 is copied to the local file C for input to the Contour Processor.

```
BASJOB,T12000,CM270000.                DELIVERY INFO
USER,........
CHARGE,.......,LRC.
VSN(TAPE51=NYYYYY,TAPE52=NZZZZZZ)
SET(R3=0)
BEGIN,A1,A2,XXX001,XXX002,XXX003,XXX004,XXX005,XXX006,XXX007,XXX008,XXXR,XXX.
REWIND,TAPE6.
ROUTE,TAPE6,DC=LP.
EXIT.
```

```
EDITING NOTES:
  - INSERT ACTUAL REEL NUMBERS IN VSN STATEMENT
  - REPLACE XXX WITH F.A.A. IDENTIFIER
```

Figure 11.-Submit File for Baseline Execution

```
.PROC,A1,A,B,C,D,E,F,G,H,J,K.
***********************************************************************
* FILE A2 CONTAINS THE 5 FOLLOWING PROCEDURE FILES:
*      A1 : DRIVER FOR A COMPLETE ALAMO RUN
*      B1 : EXECUTES PHASE 2 OF ALAMO
*      C1 : WRITES FILES PRODDUCED BY ALAMO RUN TO
*           TAPE (TAPE51 FOR SUCCESSFUL RUN, TAPE52
*           FOR RUN WITH ERRORS)
*      D1 : INITIALIZES TAPES USED IN ALAMO RUN
*      G1 : GENERATES POPULATION GRID AND STANDARD
*           TRACKS
***********************************************************************
* A1 PROCEDURE PARAMETER IDENTIFICATION:
*       A  : INM INPUT CASE
*       B  : LISTABLE INM OUTPUT
*       C  : INM OUTPUT - CONTOUR POINTS (PHASE 2 INPUT)
*       D  : PHASE 1 OUTPUT (SITE II INPUT)
*       E  : SAVPLT FILE - OUTPUT FROM PHASE 1
*       F  : SITE II OUTPUT (PARTIAL)
*       G  : SITE II OUTPUT (COMPLETE) - INPUT FOR PHASE 2
*       H  : 10TH PAGE ALAMO REPORT (BASELINE CASE)
*       J  : 10TH PAGE ALAMO REPORT (COUNTERMEASURE CASE)
*       K  : ALAMO AUXILIARY FILE (INPUT FOR PHASES 1 AND 2)
***********************************************************************
*
* IF R3=1, NOISE REDUCTION SIMULATION RUN IS IN PROGRESS;
* A MODIFIED VERSION OF INM DATABASE ALREADY EXISTS
*
ATTACH,CONTORA.
IFE,(R3.NE.1),LABEL1.
ATTACH,DATABIN.
COPYEI,DATABIN,TAPE7.
REWIND,TAPE7.
RETURN,DATABIN.
ENDIF,LABEL1.
GET,A.
*
* EXECUTE THE INM MODULE OF ALAMO
*
CONTORA,A,B.
SEND,B,DC=LP.
RETURN,CONTORA.
REWIND,TAPE2.
COPYEI,TAPE2,C.
SKIP(LABELA)
EXIT.
SKIP(LABEL99)
ENDIF(LABELA)
RETURN,TAPE5,TAPE6,TAPE2,TAPE8.
RETURN,TAPE9,TAPE3,TAPE7.
```

Figure 12.-Baseline Procedure File A1

```
ATTACH,CONTORA.
IFE,(R3.NE.1),LABEL1.
ATTACH,DATABIN.
COPYEI,DATABIN,TAPE7.
REWIND,TAPE7.
RETURN,DATABIN.
ENDIF,LABEL1.
GET,A.
*
* EXECUTE THE INM MODULE OF ALAMO
*
CONTORA,A,B.
SEND,B,DC=LP.
RETURN,CONTORA.
REWIND,TAPE2.
COPYEI,TAPE2,C.
SKIP(LABELA)
EXIT.
SKIP(LABEL99)
ENDIF(LABELA)
RETURN,TAPE5,TAPE6,TAPE2,TAPE8.
RETURN,TAPE9,TAPE3,TAPE7.
*
* EXECUTE PHASE 1
*
REWIND,C.
GET,ALPHS1A,K.
ALPHS1A,C,,,,,K.
MAP,OFF.
IFE,(R3.EQ.0),LABEL6.
REPLACE,K.
SET(R1G=R2)
```

Figure 13.-INM and Contour Processor Execution

4.2.2 Contour Processor

The indirect access file AUPHS1A containing the absolutes for the Contour Processor program PHASE1 is loaded along with the Airport Auxiliary File (named file XXX). The noise contour data (named file XXX003) is input through the C parameter to the Contour Processor AUPHS1A, along with the Airport Auxiliary File through the K parameter. A plot vector file SAVPLT is generated to plot the noise polygons. The SITE II (named file XXX004) input file is also generated on TAPE1 and copied to the D file to serve as input to the SITE II phase 1 processor.

4.2.3 SITE II Demographic Processor

Prior to running the SITE II phase 1 processor, the direct access files containing the block group or census track portion of the SITE II database are attached as logical unit files TAPE21, TAPE22, and TAPE23. The indirect access file PH1A containing the SITE II phase 1 processor program MAIN1 is loaded. The SITE II input file is input to PH1A through the D parameter and the input reflection file (named file XXX006) is output through the F parameter after execution. The SITE II control file is generated on TAPE1 to be sorted using the CDC sort/merge utility SORTMRG.

The direct access files containing the state census data portion of the SITE II database are attached as logical unit files TAPE31, TAPE32 and TAPE33. The indirect access file PH2A containing the SITE II phase 2 processor program MAIN2 is loaded and executed. The SITE II report file (named file XXX007) is output through the F parameter. The F file is then copied to the G file for input to the Report Generator.

4.2.3 Report Generator

The procedure file B1 is invoked using the BEGIN statement to process the Report Generator (see fig. 15). The listing of B1 describes the parameters used in the procedure file as illustrated in figure 16. The indirect access file AUREPTA containing the Report Generator program REPORTS is loaded, along with the Airport Auxiliary File (named file XXX). The SITE II report file is input to AUREPTA through the G parameter and the Airport Auxiliary File is input through the K parameter. After execution, the noise exposure correlation and demographic noise exposure reports are written on TAPE6 and the 10th page ALAMO report is written and saved on the permanent file J (named file XXXR). The reports on TAPE6 are printed before job control is returned to the procedure A1.

```
.PROC,B1,G,H,J,K.
******************************************************************************
* B1 EXECUTES PHASE 2 OF ALAMO
*
* B1 PROCEDURE PARAMETER IDENTIFICATION:
*       G : SITE II REPORTS (PHASE 2 INPUT)
*       H : 10TH PAGE ALAMO REPORT (COUNTERMEASURE CASE)
*       J : 10TH PAGE ALAMO REPORT (BASELINE CASE)
*       K : ALAMO AUXILIARY FILE
******************************************************************************
GET,ALREPTA.
GET,K.
REWIND,G.
PACK,G.
MAP,OFF.
ALREPTA,G,TAPE6,,,K,H.
REWIND,H,TAPE6.
COPYEI,TAPE6.
IFE,(R3.EQ.0),LABEL4.
REPLACE,G.
COPYEI,H,J.
REWIND,J.
SAVE,J.
REWIND,H,K,TAPE6.
PACK,K.
REPLACE,K.
ELSE,LABEL4.
APPEND,J,H.
ENDIF,LABEL4.
REVERT.MYCCL
```

Figure 14.-Report Generator Execution

```
.PROC,B1,G,H,J,K.
******************************************************************************
* B1 EXECUTES PHASE 2 OF ALAMO
*
* B1 PROCEDURE PARAMETER IDENTIFICATION:
*       G : SITE II REPORTS (PHASE 2 INPUT)
*       H : 10TH PAGE ALAMO REPORT (COUNTERMEASURE CASE)
*       J : 10TH PAGE ALAMO REPORT (BASELINE CASE)
*       K : ALAMO AUXILIARY FILE
******************************************************************************
GET,ALREPTA.
GET,K.
REWIND,G.
PACK,G.
MAP,OFF.
ALREPTA,G,TAPE6,,,K,H.
REWIND,H,TAPE6.
COPYEI,TAPE6.
IFE,(R3.EQ.0),LABEL4.
REPLACE,G.
COPYEI,H,J.
REWIND,J.
SAVE,J.
REWIND,H,K,TAPE6.
PACK,K.
REPLACE,K.
ELSE,LABEL4.
APPEND,J,H.
ENDIF,LABEL4.
REVERT.MYCCL
```

Figure 15.-Baseline Procedure File B1

APPENDIX A

SOURCE DOCUMENTATION

The following listings are the source code documentation for the auxiliary programs developed here at LaRC for the ALAMO System. The documentation consist of two program modules and their corresponding subroutines and function subprograms; the contour data processor program AUPHS1 and the report generator program AUREPT. Each routine description contains the objective, the method used (where applicable), the input/output parameters, the calling routines, the routines referenced, a local variable dictionary, a description of common block variables and a description of the files used.

```
C
C
C                        PROGRAM AUPHS1
C
C
C     OBJECTIVE:
C              THIS PROGRAM PROCESSES THE INTEGRATED NOISE MODEL(INM)
C              CONTOUR OUTPUT FILE.  THE MAIN OBJECTIVE IS TO CONVERT
C              THE X,Y CONTOUR DATA INTO A SET OF POLYGONS IN AN INPUT
C              FORM WHICH IS COMPATIBLE WITH SITE II, A DEMOGRAPHICS
C              PROGRAM.  AS THE POLYGONS ARE DEFINED THEY ARE PLOTTED
C              USING A STANDARD X,Y PEN-PLOTTER(CALCOMP).  THE PROGRAM
C              ALSO PERFORMS SOME SECONDARY FUNCTIONS AS REQUIRED BY THE
C              LIMITATIONS OF THE PROGRAMS THAT ARE DEPENDENT ON THE
C              DATA IT PRODUCES.  A NOTABLE SECONDARY FUNCTION IS THE
C              REDUCTION OF DATA POINTS ON THE INM CONTOURS TO CONFORM
C              TO THE SITE II RESTRICTION OF NO MORE THAN 150 POINTS PER
C              SITE II EXECUTION.
C
C
C     METHOD:
C              THE PROGRAM READS THE X,Y DATA REPRESENTING A CONSTANT
C              LEVEL NOISE METRIC CONTOUR AND REDUCES THE NUMBER OF X,Y
C              POINTS TO LESS THAN 150.  AN OCTANT LINE COMPASS ROSE IS
C              SUPERIMPOSED OVER THE CONTOURS AND POLYGONS ARE DEFINED
C              FOR EACH OCTANT BY THE INTERSECTION OF THE OCTANT LINES
C              AND THE CONTOUR LINE.  THE POLYGON X,Y POINTS ARE
C              CONVERTED TO AN 80 CHARACTER PER LINE INPUT DECK THAT
C              MEETS THE INPUT SPECIFICATIONS FOR SITE II.  THE X,Y
C              POLYGONS ARE ALSO PLOTTED VIA THE LRCGOSF GRAPHICS
C              ROUTINES.  SUPPORTING DATA SUCH AS AIRPORT CENTROID
C              LATITUDE AND LONGITUDE AND AIRPORT NAME AND ADDRESS ARE
C              READ IN FROM AN EXTERNAL FILE NAMED TAPE2.
C
C
C     SUBPROGRAMS USED:
C              BLDARR :  EVALUATES THE SITE II CARDS FOR 150+ POINTS
C                        VIOLATION AND ADJUSTS IF NECESSARY.
C              CALPLT :  PLOTTER PEN CONTROL ROUTINE; USED HERE TO
C                        TERMINATE THE PLOT FILE.
C              CHKREC :  LOOKS FOR A MESSAGE ON THE CONTOUR INPUT FILE.
C              INIT   :  READS THE SUPPLEMENTAL DATA FILE, TAPE2 AND
C                        INITIALIZES CERTAIN CRITICAL VARIABLES.
C              OCTANT :  DRIVES THE CONSTRUCTION OF AN OCTANT ORDINAL
C                        TABLE AND THE DEFINITION OF THE POLYGONS.
C              PLOT   :  INITIALIZES THE PLOT VECTOR FILE, COMPUTES THE
C                        PLOT SCALE FACTOR AND CAUSES THE COMPASS ROSE
C                        TO BE DRAWN.
C              RDCONTR:  INPUTS THE DATA FOR 1 NOISE CONTOUR.
C              RESTPLT:  ROUTINE USED TO PLOT THE RANGE OF THE LDN VALUES
C                        FOUND
```

```
C              SETCON :  COMPASS ROUTINE ENTRY POINT FOR SETTING THE 3
C                        JOB CONTROL REGISTERS.
C              SITE2  :  DRIVES THE POINT REDUCTION PROCESS.
C              TRNSLT :  PERFORMS X,Y POINT TRANSLATION ON X,Y CONTOUR
C                        POINTS BASED ON DATA ON FILE TAPE2.
C
C
C      FUNCTIONS USED:
C              NONE
C
C
C      LOCAL VARIABLE DICTIONARY:
C              EWDIS  :  EAST/WEST DISPLACEMENT FROM LATITUDE POINT.
C              FACT   :  THE LENGTH OF THE POSITIVE X AND Y AXIS IN
C                        INCHES.
C              H      :  X DISTANCE TRANSLATION.
C              ICASE  :  STORAGE FOR CASE NAME INFORMATION.
C              ISW    :  INTEGER VARIABLE USED AS AN INDICATOR OF RECORD
C                        STRUCTURE OF TAPE5
C              ITITLE :  8 WORD ARRAY STORING THE AIRPORT TITLE.
C              JJ     :  INTEGER USED AS LOOP COUNTER
C              K      :  Y DISTANCE TRANSLATION.
C              KEOF   :  END-OF-FILE FLAG SET TO 1 BY RDCONTR TO
C                        INDICATE E-O-F ON CONTOUR INPUT FILE.
C              LAT    :  LATITUDE OF AIRPORT CENTROID IN CHARACTER FORM.
C              LDN    :  NOISE METRIC VALUE IN CHARACTER FORM.
C              LINE   :  CHARACTER STORAGE FOR NOISE METRICS AS THEY
C                        ACCUMULATE.
C              LONG   :  LONGITUDE OF AIRPORT CENTROID IN CHARACTER FORM
C              MET    :  NOISE METRIC IN CHARACTER FORM; EG:"LDN"
C              NCON   :  18 BIT INTEGER VALUE TO SET JCR R1 VIA SETCON.
C              NEWPTS :  THE NUMBER OF X,Y POINTS AFTER POINT REDUCTION.
C              NPTS   :  THE NUMBER OF X,Y POINTS BEFORE POINT REDUCTION
C              NR3    :  JOB CONTROL REGISTER, R3.
C              NSDIS  :  NORTH/SOUTH DISPLACEMENT FROM LONGITUDE POINT.
C              NSTCON :  18 BIT INTEGER VALUE TO SET JCR R2 VIA SETCON.
C              RUNCNT :  COUNTER OF CONTOURS CORRESPONDING TO ONE SITE
C                        RUN PER COUNT OF RUNCNT.
C              SCALE  :  THE PLOTTING SCALE FACTOR.
C              X      :  THE X POINTS OF THE CONTOUR BEFORE POINT REDUCT
C              XNEW   :  THE X POINTS OF THE CONTOUR AFTER POINT REDUCT.
C              Y      :  THE Y POINTS BEFORE REDUCTION.
C              YNEW   :  THE Y POINTS AFTER  REDUCTION.
C
C
C      COMMON BLOCK CROSS-REFERENCE LIST:
C              NONE
C
C
```

```
C       COMMON VARIABLES:
C               /ITITL/
C                       ICASE1 :  4-WORD ARRAY CONTAINING CASE TITLE
C               /PLTINFO/
C                       CENT   : THE CENTER X AND Y VALUE OF THE COMPASS
C                                ROSE
C                       HT     : THE HEIGHT IN INCHES OF CHARACTERS TO BE
C                                NOTATED
C                       ISTRIN : CHARACTER STRING (2 WORDS) USED TO NOTATE
C                                RANGE OF LDN VALUES
C                       S      : THE DISTANCE FROM THE LEADING EDGE OF A
C                                SYMBOL TO THE LEADING EDGE OF THE NEXT
C                                SYMBOL
C                       W      : REAL VARIABLE REPRESENTING THE WIDTH OF
C                                ONE SYMBOL
C
C
C       FILES USED:
C               INPUT:
C                     TAPE5 - SEQUENTIAL INPUT FILE CONTAINING THE CONTOUR
C                             X,Y POINTS AND SUPPORTING DATA IN DISPLAY
C                             CODE FORMAT.
C                          CARD1      DATE IN YY/MM/DD. FORM.
C                          CARD2      INM BANNER AND VERSION ID.
C                          CARD3      NOISE METRIC AND VALUES.
C                          CARD4      CASE TITLE
C                          CARD5      NULL RECORD OR SPECIAL MESSAGE. IF A
C                                     SPECIAL MESSAGE EXISTS, IT IS FOLLOWED
C                                     BY A VARIABLE NUMBER OF EMPTY RECORDS
C                                     (CARD5B, CARD5C, ETC.).
C                          CARD6      6I11,6E11.5 WHERE THE 6TH INTEGER IS
C                                     THE NUMBER OF CONTOUR POINTS.
C                          CARD7-16   (10E14.7 FORMAT)THE 1ST 10 X POINTS.
C                          CARD17-25  THE 2ND 10 X POINTS.
C                             .
C                             .
C                             .
C                          CARD K-K+9(10E14.7 FORMAT)THE 1ST 10 Y POINTS.
C                             .
C                             .
C                             .
C                          E-O-F
C                          N E X T   C O N T O U R   A S   A B O V E
```

```
C                   TAPE2 - SEQUENTIAL INPUT FILE CONTAINING
C                           SUPPLEMENTAL DATA NOT GIVEN ON TAPE5.
C                           DISPLAY CODE FORMAT:
C                       CARDS 1-6  - INFORMATION USED BY OTHER ALAMO
C                                     PROGRAMS THAT SHARE THIS FILE
C                       CARD7        LATITUDE,LONGITUDE,NORTH/SOUTH AND
C                                    EAST/WEST DISPLACEMENT.
C                       CARD8        H,K TRANSLATION VALUES.
C                       CARD9        POSITIVE X,Y AXIS LENGTH FOR PLOT.
C                       CARD10       AIRPORT TITLE
C                       CARD11       AIRPORT ADDRESS.
C               OUTPUT:
C                   TAPE6 - CONVENTIONAL FORTRAN STANDARD OUTPUT FILE;
C                           CURRENTLY NOT USED.
C                   TAPE1 - SEQUENTIAL FILE CONTAINING SITE II INPUT
C                           DECK, EACH DESCRIBING 150 POINTS OR LESS,
C                           WITH INPUT DECKS SEPARATED BY E-O-F MARKS.
C                           SEE SUBROUTINE BLDARR.
C               SCRATCH:
C                   TAPE4 - SEQUENTIAL FILE CONTAINING CARD IMAGES OF
C                           SITE II INPUT DECKS BEFORE PROCESSING BY
C                           BLDARR.
C
C
```

```
C
C
C                       SUBROUTINE CHKREC
C
C
C     OBJECTIVE:
C             TO DETERMINE IF A MESSAGE, REGARDING USER-DEFINED PRO-
C             FILES, IS WRITTEN ON THE INPUT FILE (TAPE5)
C
C
C     METHOD:
C             SUBROUTINE CHKREC EVALUATES TAPE5 TO DETERMINE THE
C             NUMBER OF RECORDS BETWEEN THE CARD IMAGE CONTAINING
C             THE NOISE METRIC VALUE AND THE BEGINNING OF THE
C             XY-DATA POINTS
C
C
C     PARAMETERS:
C             INPUT:
C                 NONE
C             OUTPUT:
C                 ICASE: 8-WORD ARRAY CONTAINING CASE NAME IN WORDS 5
C                        THROUGH 8
C                 ISW:   INTEGER VARIABLE USED TO INDICATE THE NUMBER
C                        OF RECORDS TO BE SKIPPED PRIOR TO THE READING
C                        OF THE XY DATA POINTS
C
C
C     CALLING ROUTINE:
C             AUPHS1 (MAIN PROGRAM)
C
C
C     SUBPROGRAMS USED:
C             NONE
C
C
C     FUNCTIONS USED:
C             NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C             IBLANK: INTEGER ARRAY USED TO CONTAIN THE POTENTIAL
C                     SPECIAL MESSAGE
C             J:      INTEGER VARIABLE USED AS LOOP COUNTER
C             KEOF:   INTEGER VARIABLE USED AS A FLAG TO INDICATE AN
C                     EARLY END-OF-INPUT
C
C
```

```
C     FILES USED:
C             INPUT:
C                 TAPE5 - SEQUENTIAL FILE CONSISTING OF VARIABLE-
C                     LENGTH RECORDS; SUBROUTINE CHKREC IS CONCERNED
C                     WITH THE FORMAT OF THE FIFTH Z-TYPE RECORD ON
C                     TAPE5; WITH NO SPECIAL MESSAGE, THIS RECORD
C                     IS BLANK; WITH SPECIAL MESSAGE, RECORD CON-
C                     SISTS OF A SPECIAL MESSAGE, FOLLOWED BY A
C                     VARIABLE NUMBER OF EMPTY RECORDS
C             OUTPUT:
C                 NONE
C             SCRATCH:
C                 NONE
C
C
```

```
C
C
C                         SUBROUTINE RDCONTR
C
C
C     OBJECTIVE:
C             THIS ROUTINE READS THE HEADER DATA AND THE X,Y POINTS FOR
C             A NOISE CONTOUR AS OUTPUT BY INM.
C
C
C     PARAMETERS:
C             INPUT:
C                  ISW:       INTEGER VARIABLE USED TO POSITION CORRECTLY
C                             TO XY DATA POINTS ON TAPE5
C             OUTPUT:
C                  LINE:      STORAGE FOR NOISE METRIC AND VALUES.
C                  X:         X POINTS FOR CONTOUR
C                  Y:         Y POINTS FOR CONTOUR
C                  NPTS:      THE NUMBER OF X,Y POINTS.
C                  KEOF:      SET TO 1 TO INDICATE EOF ON INPUT FILE.
C
C
C     CALLING ROUTINE:
C             AUPHS1
C
C
C     SUBPROGRAMS USED:
C             NONE
C
C
C     FUNCTIONS USED:
C             EOF     :  SYSTEM END-OF-FILE CHECK.
C
C
C     LOCAL VARIABLE DICTIONARY:
C             A,B,C,D
C             E,F,I,J
C             K,L,M   :  DUMMY VARIABLES FOR I/O LIST ONLY.
C             IJ      :  IMPLIED DO-LOOP INDEX.
C
C
C     COMMON VARIABLES:
C             NONE
C
C
C     FILES USED:
C             INPUT:
C                  TAPE5 - SEQUENTIAL INPUT FILE CONTAINING THE CONTOUR X,Y
C                          POINTS AND HEADER DATA.(SEE MAIN PROGRAM)
C             OUTPUT:
C                  NONE
```

```
C
C
C                        SUBROUTINE INIT
C
C
C     OBJECTIVE:
C              THIS ROUTINE READS THE SUPPLEMENTAL DATA FILE, TAPE2.
C
C
C     PARAMETERS:
C              INPUT:
C                   NONE
C              OUTPUT:
C                   LAT    :  AIRPORT CENTROID LATITUDE.
C                   LONG   :  AIRPORT CENTROID LONGITUDE.
C                   NSDIS  :  NORTH/SOUTH DISPLACEMENT.
C                   EWDIS  :  EAST/WEST DISPLACEMENT.
C                   H      :  X AXIS TRANSLATION DISTANCE.
C                   K      :  Y AXIS TRANSLATION DISTANCE.
C                   FACT   :  PLOT AXIS LENGTH.
C                   ITITLE :  AIRPORT TITLE.
C
C
C     CALLING ROUTINE:
C              AUPHS1
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              EOF     :  SYSTEM END-OF-FILE TEST.
C
C
C     LOCAL VARIABLE DICTIONARY:
C              NO LOCAL VARIABLES
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              INPUT:
C                   TAPE2 - SEQUENTIAL INPUT FILE IN DISPLAY CODE FORMAT
C                           SEE MAIN PROGRAM FOR CARD BY CARD FORMAT.
```

```
C                         SUBROUTINE SITE2
C
C
C     OBJECTIVE:
C             THIS ROUTINE DRIVES THE POINT REDUCTION SOFTWARE.  ITS
C             OBJECTIVE IS TO DELETE AS MANY POINTS AS POSSIBLE FROM
C             A NOISE CONTOUR WITHOUT CHANGING THE TOTAL AREA THAT THE
C             CONTOUR ENCLOSES BY MORE THAN 1 PERCENT.  THE MINIMUM
C             OBJECTIVE IS TO REDUCE THE CONTOUR TO LESS THAN 150 PTS.
C
C     METHOD:
C             THE ROUTINE SETS THE REDUCTION TARGET TO 65 POINTS AND
C             CALCULATES THE AREA OF THE ORIGINAL CONTOUR.  THE POINT
C             REDUCTION ROUTINE IS CALLED ITERATIVELY UNTIL THE AREA
C             RESTRICTION IS MET.  THE TARGET NUMBER OF POINTS IS
C             INCREASED BY 5 ON EACH ITERATION.
C
C
C     PARAMETERS:
C             INPUT:
C                  X       :  THE ORIGINAL CONTOUR X POINTS.
C                  Y       :  THE ORIGINAL CONTOUR Y POINTS.
C                  N       :  THE NUMBER OF POINTS IN THE ORIG. CONTOUR.
C             OUTPUT:
C                  XNEW    :  THE X POINTS AFTER REDUCTION.
C                  YNEW    :  THE Y POINTS AFTER REDUCTION.
C                  NEWNUM  :  THE NUMBER OF POINTS AFTER POINT REDUCT.
C
C
C     CALLING ROUTINE:
C             PHASE1
C
C
C     SUBPROGRAMS USED:
C             NEWCRV :  POINT REDUCTION ALGORITHM.
C
C     FUNCTIONS USED:
C             AREA   :  CALCULATES THE AREA WITHIN A CLOSED POLYGON.
C             ABS    :  ABSOLUTE VALUE FOR REAL NUMBERS.
C
C     LOCAL VARIABLE DICTIONARY:
C             AREA1  :  THE ORIGINAL CONTOUR AREA.
C             AREA2  :  THE AREA FOR THE CONTOUR AFTER POINT REDUCTION.
C             DIF    :  THE DIFFERENCE IN AREA FOR THE ORIGINAL AND
C                       POINT REDUCED CONTOURS.
C             INT    :  THE NUMBER OF POINTS TO RELAX POINT REDUCTION
C                       BY TO MEET THE 1 PERCENT CHANGE IN AREA LIMIT.
C             ITER   :  THE NUMBER OF ITERATIONS THAT SUBROUTINE NEWCRV
C                       PERFORMED TO DELETE POINTS.
C             PRCNT  :  THE CALCULATED PERCENT CHANGE IN AREA AFTER
C                       POINT REDUCTION.
```

```
C                   SUBROUTINE NEWCRV
C
C
C     OBJECTIVE:
C             TO DELETE THE MOST UNNECESSARY POINTS BELOW A GIVEN
C             MAXIMUM ON A NOISE CONTOUR.  POINTS DELETED WILL BE THOSE
C             WHICH TEND TO BE ON STRAIGHT LINE SEGMENTS OR BROAD
C             CURVES.
C
C     METHOD:
C             OF 3 CONTIGUOUS POINTS A, B AND C, POINT B WILL BE DELETED
C             WHEN THE ABSOLUTE VALUE OF THE DIFFERENCE IN SLOPES FOR
C             LINES AB AND BC IS LESS THAN A GIVEN LIMIT.  THE SIGNED
C             DIFFERENCES ARE ACCUMULATED SUCH THAT WHEN THE MAGNITUDE
C             OF THE ACCUMULATION BECOMES GREATER THAN THE LIMIT THE
C             POINT TO BE DELETED IS SAVED.  THIS PROHIBITS EXCESSIVE
C             CONTOUR DISTORTION OVER BROAD CURVES IN ONE DIRECTION.
C             IF ENOUGH POINTS CANNOT BE DELETED AFTER PROCESSING THE
C             CONTOUR THE LIMIT IS RELAXED AND A NEW ITERATION IS
C             BEGUN.  AS THE LIMIT IS RELAXED MORE POINTS WILL BE
C             DELETED AND MORE DISTORTION OF THE CONTOUR WILL BE
C             INTRODUCED.
C
C
C     PARAMETERS:
C             INPUT:
C                  X      :  X POINTS OF THE CONTOUR TO BE REDUCED.
C                  Y      :  Y POINTS OF THE CONTOUR TO BE REDUCED.
C                  N      :  THE NUMBER OF X,Y POINTS IN CONTOUR TO BE
C                            REDUCED.
C                  MAXNUM :  THE MAXIMUM NUMBER OF POINTS TO BE LEFT IN
C                            THE REDUCED CONTOUR.
C             OUTPUT:
C                  XNEW   :  THE REDUCED X POINTS.
C                  YNEW   :  THE REDUCED Y POINTS.
C                  NEWNUM :  THE NUMBER OF X,Y POINTS AFTER REDUCTION.
C                  ITER   :  THE NUMBER OF SEPARATE COMPLETE LOOPS
C                            AROUND THE CONTOUR.  IE, THE NUMBER OF
C                            RELAXATIONS OF THE SLOPE TOLERANCE.
C
C
C     CALLING ROUTINE:
C             SITE2
C
C
C     FUNCTIONS USED:
C             IOCTNT :  USED TO DETERMINE WHAT COMPASS OCTANT AN X,Y
C                       POINT IS IN.
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C             B       :  ORDINAL POINTER TO THE 1ST OF THE 3 POINTS USED
C                        TO CALCULATE THE SLOPES.
C             DELPTS  :  ARRAY STORAGE FOR ORDINALS OF DELETED POINTS.
C             DIF     :  THE DIFFERENCE IN THE SLOPES, BT AND TTP1.
C             I       :  DO LOOP INDEX OVER THE TOTAL PT. ORDINALS FOR
C                        THE ORIGINAL CONTOUR.
C             INC     :  THE RELAXATION INCREMENT VALUE FOR THE SLOPE
C                        DIFFERENCE LIMIT.
C             KI      :  THE OCTANT NUMBER OF THE MIDPOINT OF THE 3
C                        POINTS BEING EVALUATED. (B,T,TP1)
C             KJ      :  THE OCTANT NUMBER OF THE 3RD POINT, TP1 OF THE
C                        3 POINTS BEING EVALUATED.
C             KPT     :  ORDINAL POINTER FOR THE ARRAY OF NEW POINTS
C                        AFTER REDUCTION.
C             LAST    :  THE LAST ORDINAL ON THE ORIGINAL CONTOUR.
C             MAXCHG  :  THE LIMIT FOR DIFFERENCE IN SLOPES WHEN A POINT
C                        IS OR IS NOT DELETED.
C             M1      :  THE SLOPE OF LINE SEGMENT BT.
C             M2      :  THE SLOPE OF LINE SEGMENT TTP1.(TP1= T + 1)
C             NEXT    :  NEXT AVAILABLE SLOT PTR FOR DELETED POINTS
C                        ARRAY, DELPTS.
C             NPT     :  NEXT AVAILABLE SLOT PTR FOR NEW POINTS ARRAY.
C             SUM     :  ACCUMULATOR FOR SIGNED SLOPE DIFFERENCES.
C             T       :  THE MIDDLE POINT ORDINAL FOR THE 3 POINTS UNDER
C                        SCRUTINY.  T IS THE DELETION POINT.
C             TP1     :  THE 3RD POINT ORDINAL, T + 1.
C             XZ      :  DELTA X FOR THE BT SLOPE.
C             XZ1     :  DELTA X FOR THE TTP1 SLOPE.
C
C
C     COMMON VARIABLES:
C             NONE
C
C
C     FILES USED:
C             NONE
C
C
C
```

```
C
C                         SUBROUTINE NTHSTH
C
C
C     OBJECTIVE:
C             TO CONVERT X,Y POINTS FROM FEET TO STATUTE MILES IN A
C             SITE II COMPATIBLE FORMAT USING NORTH/SOUTH/EAST/WEST
C             DESIGNATORS AND TO OUTPUT THE CONVERTED POINTS AS SITE II
C             "D" CARDS.
C
C
C     METHOD:
C             THE POINTS ARE CONVERTED FROM FEET TO STATUTE MILES BY
C             DIVIDING THE FEET UNITS BY 5280.  Y POINTS THAT ARE
C             POSITIVE ARE GIVEN AN "N" (NORTH) INDICATOR; NEGATIVE Y'S
C             ARE GIVEN AN "S" (SOUTH) INDICATOR.  THE SAME LOGIC
C             APPLIES TO X POINTS USING E/W (EAST/WEST) INDICATORS.
C
C
C     PARAMETERS:
C             INPUT:
C                 X       :  THE X PTS TO BE CONVERTED.
C                 Y       :  THE Y PTS TO BE CONVERTED.
C                 N       :  THE NUMBER OF X,Y POINTS.
C
C
C     CALLING ROUTINE:
C             POLY
C
C
C     SUBPROGRAMS USED:
C             NONE
C
C
C     FUNCTIONS USED:
C             ABS     :  ABSOLUTE VALUE FOR REAL NUMBERS.
C
C
```

```
C     LOCAL VARIABLE DICTIONARY:
C              I      :  DO LOOP INDEX TO COLUMNS OF ARRAY JBUF, A 3
C                        CO-ORDINATE BUFFER (1"D" CARD COMPLEMENT).
C              J      :  IMPLIED DO LOOP INDEX FOR COLUMNS OF JBUF.
C              JBUF   :  BUFFER ARRAY FOR 3 CO-ORDINATES FOR A "D" CARD.
C              K      :  IMPLIED DO LOOP INDEX FOR ROWS OF JBUF WHEN
C                        THERE ARE LESS THAN 3 POINTS (LAST "D" CARD).
C              KPT    :  TOTAL CO-ORDINATE COUNTER TO PREVENT WRITING
C                     :  ONE OR TWO EXTRA POINTS ON LAST "D" CARDS.
C              KTRI   :  FORMAT REPETITION COUNT.
C              L      :  IMPLIED DO LOOP INDEX FOR COLUMNS OF JBUF
C              XMILES :  THE ABSOLUTE VALUE IN MILES OF THE CURRENT
C                        X POINT.
C              YMILES :  SAME AS XMILES BUT FOR Y POINTS.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              INPUT:
C                   NONE
C              OUTPUT:
C                   NONE
C              SCRATCH:
C                   TAPE4 - SEQUENTIAL FILE FOR SITE II INPUT DECKS.
C                           IT IS SUBSEQUENTLY REPROCESSED FOR 150 POINT
C                           RESTRICTION VIOLATIONS.
C
C
```

```
C
C
C                       SUBROUTINE TRNSLT
C
C
C     OBJECTIVE:
C              TO TRANSLATE THE AXIS FOR THE NOISE CONTOURS.
C
C
C     METHOD:
C              THE TRANSLATION VALUES H AND K ARE SUBTRACTED FROM EACH
C              X AND Y POINT RESPECTIVELY.
C
C
C     PARAMETERS:
C              INPUT:
C                   X       :  X PTS FOR CONTOUR.
C                   Y       :  Y PTS FOR CONTOUR.
C                   NPTS    :  THE NUMBER OF X,Y PTS.
C                   H       :  THE X TRANSLATION FACTOR.
C                   K       :  THE Y TRANSLATION FACTOR.
C
C
C     CALLING ROUTINE:
C              AUPHS1
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              I      :  DO LOOP INDEX OVER THE NUMBER OF PTS.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              NONE
C
C
```

```
C                           FUNCTION AREA
C
C
C     OBJECTIVE:
C             TO CALCULATE THE AREA IN SQ UNITS OF A CLOSED POLYGON.
C
C
C     METHOD:
C             A SPECIAL FORM OF GREEN'S THEOREM IS EMPLOYED:
C
C                                 N
C                AREA = .5 * SUM   (X *Y    - X   *Y )
C                               I=0   I  I+1    I+1  I
C
C                WHERE X    = X          Y    = Y
C                       N+1    0          N+1    0
C
C
C     PARAMETERS:
C             INPUT:
C                  X      :  THE CONTOUR X POINTS.
C                  Y      :  THE CONTOUR Y POINTS.
C                  N      :  THE NUMBER OF X,Y POINTS.
C             OUTPUT:
C                  AREA   :  FUNCTION VALUE RETURNED FOR THE CONTOUR
C                            AREA.
C
C
C     CALLING ROUTINE:
C             SITE2
C
C
C     SUBPROGRAMS USED:
C             NONE
C
C
C     FUNCTIONS USED:
C             ABS     :  ABSOLUTE VALUE.
C
C
C     LOCAL VARIABLE DICTIONARY:
C             AREA    :  SQUARE UNITS INSIDE CONTOUR.
C             I       :  DO LOOP INDEX OVER RANGE OF X,Y POINTS.
C             K       :  THE I+1 ORDINAL.
C             SUM     :  REAL VARIABLE USED IN COMPUTING CONTOUR
C                        AREA
C
```

```
C                       SUBROUTINE OCTANT
C
C
C     OBJECTIVE:
C              THIS ROUTINE CO-ORDINATES THE POLYGON DEFINITIONS.
C
C
C     PARAMETERS:
C              INPUT:
C                   X      :  THE CONTOUR X POINTS.
C                   Y      :  THE CONTOUR Y POINTS.
C                   NEWPTS :  THE NUMBER OF X,Y POINTS AFTER POINT DEL.
C                   LDN    :  THE NOISE METRIC OF THE CONTOUR.(LDN)
C                   MET    :  THE NOISE METRIC VALUE. (55 - 85)
C                   INDEX  :  THE CONTOUR COUNTER.
C                   SCALE  :  THE PLOTTING SCALE FACTOR.
C
C
C     CALLING ROUTINE:
C              AUPHS1
C
C
C     SUBPROGRAMS USED:
C              OCTTAB :  BUILDS A TABLE OF START AND END POINTS OF LINE
C                        SEGMENTS FOR EACH OCTANT.
C              POLY   :  BUILDS THE POLYGONS USING THE TABLE BUILT BY
C                        OCTTAB.
C              ENRICH :  CHECKS FOR OCTANTS SPANNED WITH NO X,Y POINTS
C                        AND PUTS IN POINTS WHEN NEEDED.
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              ITABLE :  THE START POINT/END POINT TABLE FOR LINE
C                        SEGMENTS IN EACH OCTANT.
C              KCHANGE:  FLAG THAT INDICATES POINTS WERE PUT IN AND
C                        ITABLE MUST BE REDEFINED BY OCTTAB ROUTINE.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              NONE
C
C
```

```
C                               SUBROUTINE ENRICH
C
C
C     OBJECTIVE:
C               SUBROUTINE ENRICH IS USED TO EVALUATE CERTAIN POINTS TO
C               DETERMINE IF ADJACENT POINTS ARE IN EITHER (1) THE SAME
C               OCTANT OR (2) ADJACENT OCTANTS; IF 2 ADJACENT POINTS NOT
C               IN THE SAME OCTANT ARE NOT IN ADJACENT OCTANTS, ROUTINE
C               ADDPTS IS INVOKED TO ADD POINTS IN ORDER TO DEAL WITH
C               THE SITUATION
C
C
C     PARAMETERS:
C               INPUT:
C                    ITABLE  : INTEGER ARRAY USED TO STORE THE START/END
C                              POINTS FOR LINE SEGMENTS IN EACH OCTANT
C                    NEWPTS  : THE NUMBER OF XY POINTS AFTER POINT
C                              DELETION
C                    X       : REAL ARRAY CONTAINING THE X-COORDINATES
C                              OF CONTOUR POINTS PRIOR TO POSSIBLE POINT
C                              ENRICHMENT
C                    Y       : REAL ARRAY CONTAINING THE Y-COORDINATES
C                              OF CONTOUR POINTS PRIOR TO POSSIBLE
C                              ENRICHMENT
C               OUTPUT:
C                    KCHANGE : INTEGER VARIABLE USED AS FLAG TO INDICATE
C                              THAT POINTS WERE PUT IN AND ITABLE MUST
C                              BE REDEFINED BY OCTTAB ROUTINE
C                    NEWPTS  : INTEGER VARIABLE REPRESENTING THE NUMBER
C                              OF XY POINTS AFTER POINT ENRICHMENT
C                    X       : REAL ARRAY CONTAINING X-COORDINATES OF
C                              CONTOUR POINTS AFTER POSSIBLE ENRICHMENT
C                    Y       : REAL ARRAY CONTAINING Y-COORDINATES OF
C                              CONTOUR POINTS AFTER POSSIBLE ENRICHMENT
C
C
C     CALLING ROUTINE:
C               OCTANT
C
C     SUBPROGRAMS USED:
C               ADDPTS: ROUTINE USED TO ADD POINTS ON A CONTOUR WHEN A
C                       SPECIFIED CONDITION, AS DESCRIBED IN "OBJECTIVE"
C                       SECTION
C               SYSTEM: STANDARD FTN SUBROUTINE USED TO TERMINATE
C                       PROGRAM EXECUTION AND WRITE A DAYFILE MESSAGE
```

```
C      FUNCTIONS USED:
C                INTABLE : FUNCTION USED TO DETERMINE THE OCTANT OF AN
C                          ORDINAL, IF THE ORDINAL IS IN THE START/END
C                          TABLE
C                IOCTNT  : FUNCTION USED TO DETERMINE WHAT OCTANT AN
C                          X,Y POINT RESIDES IN
C
C      LOCAL VARIABLE DICTIONARY:
C                A       : REAL ARRAY USED FOR TEMPORARY STORAGE OF THE
C                          X-COORDINATES OF CONTOUR POINTS
C                B       : REAL ARRAY USED FOR TEMPORARY STORAGE OF THE
C                          Y-COORDINATES OF CONTOUR POINTS
C                I       : INTEGER VARIABLE USED AS LOOP COUNTER AND ARRAY
C                          INDEX
C                IOCT    : INTEGER VARIABLE USED TO INDICATE IF ORDINAL
C                          IS IN THE START/END TABLE
C                IOCTM1  : INTEGER VARIABLE REPRESENTING AN ADJACENT
C                          OCTANT (COUNTERCLOCKWISE)
C                IOCTP1  : INTEGER VARIABLE REPRESENTING AN ADJACENT
C                          OCTANT (CLOCKWISE)
C                IPTR    : INTEGER USED TO COUNT POINTS IN CONTOUR
C                J       : INTEGER VARIABLE USED TO REPRESENT THE ORDINAL
C                          OF THE NEXT CLOCKWISE POINT
C                KOCT    : INTEGER VARIABLE REPRESENTING THE OCTANT OF
C                          THE ADJACENT POINT
C                NPTS    :
C
C
C      COMMON VARIABLES:
C                NONE
C
C
C      FILES USED:
C                INPUT:
C                     NONE
C                OUTPUT:
C                     NONE
C                SCRATCH:
C                     NONE
C
```

```
C                         FUNCTION INTABLE
C
C
C     OBJECTIVE:
C              FUNCTION INTABLE IS USED TO DETERMINE THE OCTANT OF AN
C              ORDINAL
C
C
C     PARAMETERS:
C              INPUT:
C                   KORD   : ORDINAL OF XY POINT
C                   ITABLE : THE START/END POINT TABLE FOR LINE SEGMENTS
C                            IN EACH OCTANT
C              OUTPUT:
C                   NONE
C
C
C     CALLING ROUTINE:
C              ENRICH
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              I : INTEGER VARIABLE USED AS LOOP COUNTER AND ARRAY INDEX
C              J : INTEGER VARIABLE USED AS LOOP COUNTER AND ARRAY INDEX
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              INPUT:
C                   NONE
C              OUTPUT:
C                   NONE
C              SCRATCH:
C                   NONE
C
C
C
```

```
C                       SUBROUTINE ADDPTS
C
C
C     OBJECTIVE:
C              SUBROUTINE USED TO ADD POINTS ON A CONTOUR WHEN A
C              SPECIFIC CONDITION, AS DESCRIBED IN ENRICH, IS ENCOUNTERED
C
C
C     PARAMETERS:
C              INPUT:
C                   A    : REAL ARRAY CONTAINING X VALUES OF CONTOUR
C                          POINTS
C                   B    : REAL ARRAY CONTAINING Y VALUES OF CONTOUR
C                          POINTS
C                   IPTR : INTEGER USED TO COUNT POINTS IN A CONTOUR
C                   NPTS : INTEGER SET TO VALUE OF 2
C                   XST  : X-COORDINATE OF POINT PRECEDING ANOTHER
C                          POINT THAT IS NOT IN THE SAME, OR ADJACENT,
C                          OCTANT
C                   YST  : Y-COORDINATE OF POINT PRECEDING ANOTHER
C                          POINT THAT IS NOT IN THE SAME, OR ADJACENT,
C                          OCTANTS
C                   XEND : X-COORDINATE OF POINT THAT HAS A PRECEDING
C                          POINT THAT SPANS MORE THN 1 OCTANT
C                   YEND : Y-COORDINATE OF POINT THAT HAS A PRECEDING
C                          POINT THAT SPANS MORE THAN 1 OCTANT
C              OUTPUT:
C                   A    : REAL ARRAY CONTAINING X VALUES OF CONTOUR
C                          POINTS AFTER POINT ENRICHMENT
C                   B    : REAL ARRAY CONTAINING Y VALUES OF CONTOUR
C                          POINTS AFTER POINT ENRICHMENT
C
C
C     CALLING ROUTINE:
C              ENRICH
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              ABS   : STANDARD FTN FUNCTION USED TO CALCULATE ABSOLUTE
C                      VALUE
C              FLOAT : STANDARD FTN FUNCTION USED TO CONVERT INTEGER
C                      TO REAL NUMBER
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C               DX     : DIFFERENCE IN THE VALUES OF THE X-COORDINATES
C                        OF THE POINTS UNDER EVALUATION
C               DY     : DIFFERENCE IN THE VALUES OF THE Y-COORDINATES
C                        OF THE POINTS UNDER EVALUATION
C               I      : INTEGER VARIABLE USED AS LOOP COUNTER
C               X      : X-COORDINATE OF NEW CONTOUR POINT FOUND
C               XINT   : REAL VARIABLE REPRESENTING INCREMENT ON THE
C                        STARTING X VALUE, WHEN COMPUTING NEW VALUE
C               Y      : Y-COORDINATE OF NEW CONTOUR POINT FOUND
C               YINT   : REAL VARIABLE REPRESENTING INCREMENT OF
C                        STARTING X-VALUE WHEN COMPUTING NEW POINT
C
```

```
C                       SUBROUTINE OCTTAB
C
C
C     OBJECTIVE:
C              THIS ROUTINE BUILDS A TABLE OF START AND END POINTS FOR
C              EACH LINE SEGMENT IN EACH OCTANT FOR THE SUBSEQUENT
C              POLYGON DEFINITIONS.
C
C
C     METHOD:
C              THE CONTOUR POINTS ARE ARRANGED IN A CLOCKWISE FASHION IN
C              ASCENDING ORDINAL ORDER.  IT IS TYPICAL THAT THE 1ST
C              POINT FALLS IN THE MIDDLE OF AN OCTANT.  THIS PROCESSOR
C              LOOKS BACKWARD (COUNTERCLOCKWISE) FROM THE 1ST POINT
C              UNTIL IT FINDS A POINT OUTSIDE THE OCTANT THAT THE 1ST
C              POINT OCCUPIES.  THE LAST COUNTERCLOCKWISE POINT THAT IS
C              INSIDE THE STARTING OCTANT IS INSERTED IN THE TABLE AS
C              INDEXED BY THE OCTANT (1-8).  THE COLUMNS OF THE TABLE
C              ARE ARRANGED AS ODD FOR START POINTS AND EVEN FOR END
C              POINTS.  FOR EXAMPLE, THE SECOND LINE SEGMENT IN OCTANT 4
C              WOULD BE STORED IN ROW 4, WITH THE START POINT IN COLUMN 3
C              AND THE END POINT IN COLUMN 4.  THE ARRAY NXTCOL IS USED TO
C              POINT TO THE NEXT AVAILABLE COLUMN ORDINAL IN EACH OCTANT
C              OF THE TABLE.  HAVING FOUND THE REAL STARTING POINT BY
C              BACKING UP AS DESCRIBED ABOVE, THE END POINT IS FOUND IN
C              THE SAME MANNER BY MOVING AHEAD (CLOCKWISE) UNTIL THE END
C              POINT IS FOUND AND STORED IN THE TABLE.  AT THIS TIME THE
C              CURRENT OCTANT BECOMES THE OCTANT THAT THE 1ST OUTSIDE
C              POINT WAS FOUND WITHIN.  THE POINT IS STORED IN THE TABLE
C              AS A START POINT AND THE CLOCKWISE PROCESS IS BEGUN AGAIN
C              BY MOVING CLOCKWISE UNTIL THE NEXT OUTSIDE POINT IS
C              FOUND.  THIS PROCESSING IS CONTINUED UNTIL THE ORIGINAL
C              STARTING POINT IS ENCOUNTERED(NOT NECESSARILY ORDINAL 1)
C              INDICATING 1 COMPLETE CLOCKWISE TRIP AROUND THE CONTOUR.
C
C
C     PARAMETERS:
C              INPUT:
C                   X       :  THE X POINTS FOR THE POINT REDUCED CONTOUR
C                   Y       :  THE Y POINTS FOR THE POINT REDUCED CONTOUR
C                   NPTS    :  THE NUMBER OF X,Y POINTS.NOTE THAT POINT
C                              1 = POINT NPTS.
C              OUTPUT:
C                   TABLE   :  THE STARTPOINT/ENDPOINT LINE SEGMENT,
C                              OCTANT TABLE.
C
C
```

```
C     CALLING ROUTINE:
C              OCTANT
C
C
C     SUBPROGRAMS USED:
C              NONE
C     FUNCTIONS USED:
C              IOCTNT :  DETERMINES THE OCTANT WHERE AN X,Y POINT
C                        RESIDES.
C
C
C     LOCAL VARIABLE DICTIONARY:
C              BEGOCT :  THE ORDINAL OF THE BEGINNING OCTANT (WHERE PT
C                        NUMBER 1 RESIDES).
C              CUROCT :  THE ORDINAL OF THE OCTANT WHERE PTS ARE BEING
C                        PROCESSED TO FIND AN OUTSIDE PT.
C              I      :  DO LOOP INDEX
C              INDEX  :  THE CONTOUR ORDINAL POINTER FOR CLOCKWISE AND
C                        COUNTERCLOCKWISE PROCESSING.
C              LSTPT  :  THE ORDINAL OF THE LAST POINT IN A LINE SEGMENT
C                        WHICH IS IN THE SAME OCTANT AS THE OTHER POINTS
C              NXTCOL :  THE VECTOR OF PTRS TO THE NEXT AVAILABLE PAIR
C                        OF COLUMNS FOR A ST/END POINT PAIR FOR THE ITH
C                        OCTANT.
C              NXTOCT :  THE OCTANT ORDINAL FOR THE NEXT CLOCKWISE PT ON
C                        A LINE SEGMENT WHICH IS COMPARED WITH THE
C                        VARIABLE CUROCT.
C              STRTPT :  THE TRUE STARTING POINT OF THE 1ST LINE SEGMENT
C                        FOUND BY BACKING UP FROM PT NUMBER 1.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              NONE
C
C
C
```

```
C                     FUNCTION IOCTNT
C
C
C     OBJECTIVE:
C             TO DETERMINE WHAT OCTANT AN X,Y POINT RESIDES IN.
C
C
C     METHOD:
C             THE OCTANTS ARE ORDERED CLOCKWISE AS FOLLOWS USING THE
C             STANDARD CARTESIAN QUANDRANTS:
C             OCTANT 1  THE UPPER HALF OF QUADRANT IV
C                    2  THE LOWER HALF OF QUADRANT IV
C                    3  THE LOWER HALF OF QUADRANT III
C                    4  THE UPPER HALF OF QUADRANT III
C                    5  THE LOWER HALF OF QUADRANT II
C                    6  THE UPPER HALF OF QUADRANT II
C                    7  THE UPPER HALF OF QUADRANT I
C                    8  THE LOWER HALF OF QUADRANT I
C
C             SPECIAL CASES ARE TESTED FOR (X = Y OR X = Y = 0) FIRST
C             THEN THE QUADRANT IS TESTED FOR.  ONCE THE QUADRANT IS
C             DETERMINED, IT IS DETERMINED ON WHAT SIDE OF THE LINE
C             Y = X OR Y = -X THE POINT FALLS.  THE SPECIAL CASES WHERE
C             THE POINT FALLS ON AN OCTANT LINE OR ON THE ORIGIN CAUSE
C             THE OCTANT TO BE DEFINED AS THE LAST OCTANT VALUE.
C
C
C     PARAMETERS:
C             INPUT:
C                  X       :  THE X POINTS OF THE CONTOUR.
C                  Y       :  THE Y POINTS OF THE CONTOUR.
C                  N       :  THE NUMBER OF POINTS IN THE CONTOUR.
C                  INDEX   :  THE ORDINAL OF THE POINT TO BE EXAMINED.
C                  LSTOCT  :  THE CURRENT OCTANT ORDINAL.
C             OUTPUT:
C                  NONE
C
C
C     CALLING ROUTINE:
C             NEWCRV
C             OCTTAB
C             POLY
C             DSTNCE
C             INTSCT
C
C
C     FUNCTIONS USED:
C             ABS     :  ABSOLUTE VALUE ROUTINE.
C
```

```
C                    SUBROUTINE POLY
C
C
C     OBJECTIVE:
C               THIS ROUTINE FORMS POLYGONS FROM THE START/END POINT
C               TABLE DEFINED BY SUBROUTINE OCTTAB.  THE POLYGONS ARE
C               FORMED BY THE CONTOUR LINES AND THEIR INTERSECTION WITH
C               THE OCTANT LINES.  WHEN A POLYGON IS DEFINED IT IS OUTPUT
C               AS A SITE II "C" CARD FOLLOWED BY THE REQUIRED NUMBER OF
C               "D" CARDS. LASTLY THE POLYGON IS PLOTTED IF THE CONTOUR
C               COUNTER IS ODD.
C
C
C     METHOD:
C               THE TABLE OF START AND END POINTS IS 1ST PROCESSED TO
C               COMPUTE THE DISTANCE FROM THE ORIGIN TO EACH START AND
C               END POINT ON AN OCTANT LINE.  TO DO THIS THE EQUATION OF
C               A LINE IS DEFINED USING A START/END POINT AND ITS
C               NEIGHBORING OUTSIDE POINT.  THIS LINE MUST INTERSECT AN
C               OCTANT LINE AND IT IS THIS INTERSECTION POINT THAT IS
C               USED FOR DISTANCE TO ORIGIN CALCULATIONS.  THE DISTANCES
C               ARE STORED IN THE TABLE DSTS.  ANOTHER TABLE, IUSED, IS
C               USED TO MARK A START/END POINT AS USED OR UNUSED SINCE
C               THE ALGORITHM WILL DO THINGS LIKE SEARCH AWAY FROM THE
C               ORIGIN FOR THE 1ST UNUSED START PT OR TOWARDS THE ORIGIN
C               FOR THE 1ST UNUSED END PT.  THE DISTANCES WERE CALCULATED
C               TO AFFORD THIS CAPABILITY.  THE POLYGON GENERATION
C               ALGORITHM CAN BE STATED AS THE FOLLOWING 4 RULES:
C               NOTE: THE CURRENT OCTANT LINE IS THE OCTANT LINE WHOSE
C                     ORDINAL = THE OCTANT NUMBER BEING PROCESSED. THE
C                     POSITIVE X AXIS IS ORDINAL 1. THE OTHER OCTANT
C                     LINES ARE NUMBERED ASCENDINGLY FROM NO.1 IN A
C                     CLOCKWISE DIRECTION.
C
C               1.  START PROCESSING AN OCTANT BY TAKING POINTS STARTING
C                   AT THE 1ST START POINT IN THE TABLE UNTIL AN END
C                   POINT IS ENCOUNTERED.
C
C               2.  WHEN AN ENDPOINT IS ENCOUNTERED ON THE CURRENT OCTANT
C                   LINE FIND THE NEXT START POINT MOVING AWAY FROM THE
C                   ORIGIN (A START PT WHOSE DISTANCE IS GREATER THAN THE
C                   END PT JUST ENCOUNTERED AND WHOSE DISTANCE IS THE
C                   MINIMUM OF OTHER QUALIFYING START PTS).  IF THE
C                   QUALIFYING START PT HAS ALREADY BEEN USED WE HAVE
C                   CLOSURE(A COMPLETE POLYGON).  IF IT HAS NOT BEEN USED
C                   IT IS SELECTED AS A MEMBER OF THE CURRENT POLYGON AND
C                   THE "USED" TABLE IS UPDATED.
C
```

```
C              3.  WHEN AN ENDPOINT IS ENCOUNTERED ON THE NEXT OCTANT
C                  LINE FIND THE NEXT START POINT MOVING TOWARD THE
C                  ORIGIN (A START PT WHOSE DISTANCE IS LESS THAN THE END
C                  PT JUST ENCOUNTERED AND WHOSE DISTANCE IS THE MAXIMUM
C                  OF OTHER QUALIFYING START PTS).  IF A START POINT CAN
C                  NOT BE FOUND THEN THE ORIGIN IS TAKEN AS THE NEXT PT.
C                  AND RULE NUMBER 2 IS APPLIED.
C
C              4.  WHEN A START/END POINT IS SELECTED IT IS NO LONGER
C                  AVAILABLE FOR LATER SELECTION.
C
C
C     PARAMETERS:
C              INPUT:
C                   TABLE  :  THE START/END POINT OCTANT TABLE.
C                   X      :  THE X POINTS OF THE CONTOUR.
C                   Y      :  THE Y POINTS OF THE CONTOUR.
C                   N      :  THE NUMBER OF X,Y POINTS.
C                   MET    :  THE TABLE OF LDN METRICS.
C                   LDNPT  :  PTR TO CURRENT LDN METRIC.
C                   LDN    :  THE METRIC NAME. ("LDN").
C                   SCALE  :  THE PLOTTING SCALE FACTOR.
C
C
C     CALLING ROUTINE:
C              OCTANT
C
C
C     SUBPROGRAMS USED:
C              DSTNCE :  CALCULATES THE DISTANCE FROM THE ORIGIN OF ALL
C                        START/END POINTS.
C              INTSCT :  FINDS THE INTERSECTION X,Y POINT OF AN OCTANT
C                        LINE AND A LINE DEFINED BY 2 X,Y POINTS WHICH
C                        STRADDLE THE OCTANT LINE.
C              NTHSTH :  CONVERTS THE POLYGON POINTS TO SITE II
C                        NORTH/SOUTH/EAST/WEST DISPLACEMENTS IN MILES.
C              PLTPOL :  ROUTINE WHICH PLOTS POLYGON X,Y POINTS.
C
C
C     FUNCTIONS USED:
C              AREA   :  CALCULATES THE AREA OF A POLYGON.
C              IOCTNT :  DETERMINES THE OCTANT NUMBER FOR A GIVEN X,Y
C                        POINT.
C
C
```

```
C     LOCAL VARIABLE DICTIONARY:
C               A       :  THE POLYGON AREA IN SQUARE MILES,OUTPUT AS F6.1
C                          ON THE SITE II "C" CARD.
C               DELTAX :   WHEN AN INTERSECTION PT IS CALCULATED ON AN
C                          OCTANT LINE, ITS PROXIMITY TO THE ALREADY
C                          EXISTING NEIGHBOR PT IS CALCULATED IN TERMS OF
C                          DELTAX AND DELTAY(THE DIFFERENCE IN X'S AND
C                          Y'S).
C               DELTAY :   SEE DELTAX.
C               DSTS    :  A TABLE OF START/END POINT DISTANCES FROM THE
C                          ORIGIN.
C               ENDDIS :   A DISTANCE TO A SELECTED END POINT(FROM THE
C                          ORIGIN).
C               I       :  DO LOOP VARIABLE FOR INITIALIZATION.
C               ICOL    :  COLUMN INDEX TO LINE SEGMENT ST/END POINT TABLE
C               ICOUNT :   COUNTER FOR THE NUMBER OF TIMES THIS ROUTINE IS
C                          CALLED.  USED TO PLOT POLYGONS ON ODD COUNTS.
C               IFLAG   :  SET TO 1 TO INDICATE THAT THIS IS AN ODD COUNT
C                          CALL.
C               INPT    :  THE "INSIDE POINT" WHEN 2 POINTS STRADDLE AN
C                          OCTANT LINE.  THE INSIDE POINT IS THE POINT
C                          WITHIN THE OCTANT BEING ANALYSED.
C               IOCT    :  THE ARRAY INDEX CORRESPONDING TO OCTANTS.
C               IPTR    :  THE NEXT AVAILABLE SLOT FOR X,Y POINT STORAGE
C                          AS THE POLYGON IS BEING FORMED.
C               IRES    :  THE RESULT OF DIVIDING ICOUNT BY 2.  WHEN
C                          ICOUNT IS ODD THE REMAINDER IS TRUNCATED
C                          SUCH THAT 2* IRES WILL NOT = ICOUNT.
C               IUSED   :  AN ARRAY USED TO MARK ST/END POINTS AS USED OR
C                          UNUSED DURING POLYGON DEFINITION.
C               J       :  MISCELLANEOUS DO LOOP COUNTER.
C               JPTR    :  THE NEXT AVAILABLE SLOT FOR A VECTOR OF
C                          QUALIFYING ST/END POINTS TO BE COMPARED FOR
C                          DISTANCES FROM THE ORIGIN.
C               KOCT    :  THE OCTANT ORDINAL OF AN INTERSECTION POINT ON
C                          AN OCTANT LINE.
C               KPT     :  WORKING POINTER TO THE ST/END POINTS COLUMNS.
C               KVEK    :  VECTOR FOR STORAGE OF ST/END POINTS TO BE
C                          COMPARED FOR MINS AND MAXES.
C               LAST    :  LAST POINT (END POINT) IN A LINE SEGMENT.
C               MVEK    :  SAME AS KVEK.
C               NPTR    :  WORKING POINTER TO EITHER AN INTERSECTION PT OR
C                          AN EXISTING POINT EXTREMELY CLOSE TO THE
C                          INTERSECTION POINT.
C               NUM     :  ON AN EVEN VALUE OF ICOUNT NUM WILL BE EQUAL TO
C                          ICOUNT.  ON ODD VALUE NUM WILL NOT EQUAL ICOUNT
```

```
C             OUTPT  :  SEE INPT.  THE OUTSIDE POINT.
C             WHERE  :  AN INTEGER ARRAY OF OCTANT NUMBERS THAT
C                       CORRESPOND TO THE ST/END POINTS.  WHERE IS
C                       DEFINED BY SUBROUTINE DSTNCE.
C             XMAX   :  THE VALUE OF THE MAXIMUM DISTANCE AWAY FROM THE
C                       ORIGIN ALONG AN OCTANT LINE.
C             XMIN   :  THE VALUE OF THE MINIMUM DISTANCE AWAY FROM THE
C                       ORIGIN ALONG AN OCTANT LINE.
C             XNEW   :  THE X VALUE OF AN INTERSECTION POINT ON AN
C                       OCTANT LINE.
C             XPTS   :  THE X VALUES IN CLOCKWISE ORDER OF THE POLYGON
C                       BEING FORMED.
C             YNEW   :  THE Y INTERSECTION VALUE.  (SEE XNEW)
C             YPTS   :  THE Y POINTS. (SEE XPTS)
C
C
C      COMMON VARIABLES:
C             NONE
C
C
C      FILES USED:
C             SCRATCH:
C                  TAPE4  :  COLLECTS SITE II CARDS FOR SUBSEQUENT
C                            POST PROCESSING.
C
```

```
C                         SUBROUTINE DSTNCE
C
C
C      OBJECTIVE:
C               TO COMPUTE THE DISTANCE FROM THE ORIGIN TO EVERY START
C               AND END POINT IN THE START/END POINT OCTANT TABLE AND
C               TO LOCATE THE OCTANT ORDINAL FOR EACH START/END POINT.
C
C
C      METHOD:
C               GIVEN THE ORDINAL OF A START POINT WHICH IS INSIDE OR ON
C               OCTANT LINE I, IT IS POSSIBLE TO CALCULATE A NEW POINT ON
C               THE OCTANT LINE BY FORMING THE INTERSECTION OF THE OCTANT
C               LINE AND THE LINE FORMED BY THE START POINT AND ITS PRED-
C               ECESSOR.    ONCE THE INTERSECTION POINT IS OBTAINED THE
C               DISTANCE FORMULA IS USED WITH THE ORIGIN AS THE 2ND POINT
C               TO FIND THE DISTANCE TO THE ORIGIN.  THE INTERSECTION
C               POINT IS ALSO PASSED TO FUNCTION IOCTNT WHICH RETURNS THE
C               ORDINAL OF THE OCTANT LINE THAT THE START/END POINT
C               RESIDES ON.
C
C
C      PARAMETERS:
C               INPUT:
C                    TABLE  :  THE START/END POINT OCTANT TABLE.
C                    X      :  THE X POINTS OF THE CONTOUR BEING
C                              PROCESSED.
C                    Y      :  THE Y POINTS OF THE CONTOUR BEING
C                              PROCESSED.
C                    N      :  THE NUMBER OF X,Y POINTS.
C               OUTPUT:
C                    DSTS   :  THE TABLE OF START/END POINT DISTANCES
C                              TO THE ORIGIN.
C                    WHERE  :  THE TABLE OF OCTANT ORDINALS FOR EACH
C                              START/END POINT.
C
C
C      CALLING ROUTINE:
C               POLY
```

```
C      SUBPROGRAMS USED:
C               INTSCT :  CALCULATES THE INTERSECTION OF A LINE WITH AN
C                         OCTANT LINE GIVEN 2 POINTS THAT ARE KNOWN TO
C                         STRADDLE AN OCTANT LINE.
C
C
C      FUNCTIONS USED:
C               IOCTNT :  DETERMINES THE ORDINAL OF THE OCTANT WHERE A
C                         POINT RESIDES.
C               SQRT   :  FORTRAN SQUARE ROOT FUNCTION FOR REALS.
C
C      LOCAL VARIABLE DICTIONARY:
C               I      :  DO LOOP INDEX FOR OCTANT ORDINALS.
C               INPT   :  A POINT WHICH IS LOCATED INSIDE A CERTAIN
C                         OCTANT.
C               J      :  DO LOOP INDEX TO START/END POINTS.
C               OUTPT  :  A POINT WHICH IS IN AN ADJACENT OCTANT RELATIVE
C                         TO EITHER ITS PREDECESSOR OR SUCCESSOR POINT.
C               RAD    :  SPECIAL FORM OF THE DISTANCE FORMULA WHEN ONE
C                         POINT IS THE ORIGIN:   D = SQRT(RAD) WHERE
C                         RAD = X**2 + Y**2.
C               XNEW   :  X COORDINATE OF INTERSECTION POINT WHOSE
C                         DISTANCE IS TO BE COMPUTED.
C               YNEW   :  Y COORDINATE (SEE XNEW).
C
C
C      COMMON VARIABLES:
C               NONE
C
C
C      FILES USED:
C               NONE
C
C
C
```

```
C                         SUBROUTINE INTSCT
C
C
C      OBJECTIVE:
C                GIVEN TWO POINTS, CALCULATE THE EQUATION OF THE LINE THEY
C                LIE ON, DETERMINE THE UNIQUE OCTANT OF EACH POINT TO FIND
C                THE OCTANT LINE THEY STRADDLE AND FIND THE POINT OF
C                INTERSECTION ON THE OCTANT LINE.
C
C
C      METHOD:
C                THE OCTANT LINES ARE THE SPECIAL FORMS: Y = X, Y = -X,
C                Y = 0, X = 0.  GIVEN THE 2 POINTS IT IS POSSIBLE TO
C                DETERMINE THE STRADDLED OCTANT LINE USING THE FUNCTION
C                IOCTNT WHICH DETERMINES THE OCTANT ORDINAL FOR A GIVEN
C                POINT.  ONCE THE OCTANT LINE IS KNOWN ITS EQUATION IS
C                ALSO KNOWN.  THE EQUATION OF THE LINE FOR THE 2 GIVEN
C                POINTS IS OBTAINED USING THE POINT-SLOPE FORMULA.  THEN
C                CRAMER'S RULE IS USED TO CALCULATE THE INTERSECTION X,Y
C                VALUES.  SPECIAL CASES (INFINITE SLOPE) ARE HANDLED.
C
C
C      PARAMETERS:
C                INPUT:
C                     XIN    :  X VALUE OF INSIDE POINT.
C                     YIN    :  Y VALUE OF INSIDE POINT.
C                     XOUT   :  X VALUE OF OUTSIDE POINT.
C                     YOUT   :  Y VALUE OF OUTSIDE POINT.
C                OUTPUT:
C                     X      :  X VALUE OF INTERSECTION POINT.
C                     Y      :  Y VALUE OF INTERSECTION POINT.
C
C
C      CALLING ROUTINE:
C                POLY
C                DSTNCE
C
C
C
C      SUBPROGRAMS USED:
C                NONE
C
C
C      FUNCTIONS USED:
C                IOCTNT :  DETERMINES ORDINAL OF OCTANT WHERE A PT RESIDES
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C             A       :  THE X COEFFICIENT FOR THE EQUATION OF AN OCTANT
C                        LINE.
C             B       :  THE Y COEFFICIENT AS IN A ABOVE.
C             C       :  THE CONSTANT AS IN A ABOVE.
C             D       :  THE NEGATIVE SLOPE OF THE LINE FORMED BY
C                        (XIN,YIN) AND (XOUT,YOUT).
C             DELTA   :  THE DENOMINATOR OR "DELTA" FOR CRAMER'S RULE.
C             DX      :  DETERMINENT AFTER SUBSTITUTING FOR X.
C             DY      :  DETERMINENT AFTER SUBSTITUTING FOR Y.
C             E       :  Y COEFICIENT FOR THE LINE GIVEN 2 PTS.
C             F       :  THE CONSTANT FOR THE LINE GIVEN 2 PTS.
C             KI      :  THE OCTANT ORDINAL FOR THE INSIDE POINT.
C             KJ      :  THE OCTANT ORDINAL FOR THE OUTSIDE POINT.
C             LFLAG   :  IDENTIFIES OCTANT LINE EQUATION WHEN SLOPE IS
C                        INFINITE FOR EQUATION OF A LINE.
C             LSTOCT  :  PARAMETER TO IOCTNT FUNCTION WHICH TELLS WHAT
C                        THE PREVIOUS OCTANT ORDINAL WAS. SET TO ZERO
C                        FOR THIS USAGE.
C             M       :  THE SLOPE OF THE LINE FOR THE INSIDE/OUTSIDE
C                        POINTS.
C
C
C     COMMON VARIABLES:
C             NONE
C
C
C     FILES USED:
C             NONE
C
C
```

```
C                         SUBROUTINE PLOT
C
C
C     OBJECTIVE:
C             TO INITIALIZE THE PLOT VECTOR FILE, CALCULATE THE SCALE
C             FACTOR, DRAW THE COMPASS ROSE AND RESET THE PLOT ORIGIN.
C
C
C     PARAMETERS:
C             INPUT:
C                  XPTS   :  THE X VALUES OF THE POLYGON TO BE PLOTTED.
C                  YPTS   :  THE Y VALUES OF THE POLYGON TO BE PLOTTED.
C                  N      :  THE NUMBER OF X,Y POINTS.
C                  ITITLE :  THE 30 CHARACTER AIRPORT TITLE.
C                  LINE   :  THE LDN METRIC TITLE INFORMATION.
C                  FACT   :  HALF THE LENGTH OF THE X,Y AXIS.
C             OUTPUT:
C                  SCALE  :  THE PLOTTING SCALE FACTOR.
C
C
C     CALLING ROUTINE:
C             AUPHS1
C
C
C     SUBPROGRAMS USED:
C             CALPLT :  GRAPHICS ROUTINE FOR MOVING THE "PEN".
C             PSEUDO :  GRAPHICS ROUTINE FOR INITIALIZING THE PLOT
C                       VECTOR FILE (PVF).
C             ROSE   :  DRAWS THE COMPASS ROSE AND TITLES.
C
C
C     FUNCTIONS USED:
C             ABS    :  ABSOLUTE VALUE FOR REAL NUMBERS.
C
C
C     LOCAL VARIABLE DICTIONARY:
C             I      :  DO LOOP INDEX OVER THE RANGE OF X,Y POINTS.
C             ZMAX   :  THE MAX VALUE OF ALL X,Y DATA POINTS.
C
C     COMMON VARIABLES:
C             NONE
C
C     FILES USED:
C             INPUT:
C                TAPE2 - SEQUENTIAL INPUT FILE USED WITH
C                        COUNTERMEASURES FOR READING IN THE
C                        PLOT SCALE OF THE BASELINE CASE
C             OUTPUT:
C                TAPE2 - SEQUENTIAL FILE USED WITH THE BASELINE
C                        CASE FOR WRITING THE PLOT SCALE OF THE
C                        BASELINE CASE
```

```
C                          SUBROUTINE ROSE
C
C
C     OBJECTIVE:
C             TO PLOT THE COMPASS ROSE, PLOT BOUNDARIES AND LABELS.
C
C
C     METHOD:
C             DRAW A SQUARE USING THE GIVEN HALF-LENGTH FOR THE X,Y
C             AXES; THEN DRAW + AND - X,Y AXES AND THE 2 LINES Y = X
C             AND Y = -X (THE DIAGONALS OF THE SQUARE).  ANNOTATE EACH
C             OCTANT WITH ITS 3-LETTER COMPASS MNEUMONIC.
C
C
C     PARAMETERS:
C             INPUT:
C                  AXISLEN:  THE HALF-LENGTH OF THE X,Y AXES.
C                  SCALE  :  THE SCALE FACTOR; USED TO DRAW THE SCALE
C                            CHART.
C                  ITITLE :  THE 30-CHARACTER AIRPORT TITLE.
C                  LINE   :  THE  LDN METRIC VALUE.
C
C
C     CALLING ROUTINE:
C             PLOT
C
C
C     SUBPROGRAMS USED:
C             BOUND  :  DRAWS BOUNDARY LINES (BOX) AND 3-LETTER
C                       COMPASS MNEUMONICS.
C             CALPLT :  GRAPHICS ROUTINE FOR PEN POSITIONING.
C             LABELS :  PARTIALLY NOTATES THE PLOT LABELS.
C             NOTATE :  GRAPHICS CHARACTER PLOTTING ROUTINE.
C
C
C     FUNCTIONS USED:
C             NONE
C
```

```
C     LOCAL VARIABLE DICTIONARY:
C              CENTER :  X COORDINATE FOR THE CENTER OF THE SCALE CHART.
C              HT     :  THE HEIGHT OF CHARACTERS IN FLOATING PT INCHES.
C              IHOL   :  HOLLERITH STRING ARRAY CONTAINING THE 3-LETTER
C                        COMPASS DIRECTION MNEUMONICS.
C              S      :  THE DISTANCE FROM THE LEFT MARGIN OF A SYMBOL
C                        TO THE LEFT MARGIN OF THE NEXT SYMBOL.
C              TOTW   :  THE TOTAL WIDTH OF THE SCALE LEDGER.
C              W      :  THE WIDTH OF 1 CHARACTER OR SYMBOL.
C              WADJ   :  THE WIDTH ADJUSTMENT WHICH IS USED TO
C                        COMPENSATE FOR CHARACTER HEIGHT.
C              X      :  THE X COORDINATE PASSED TO THE BOUNDARY LINE
C                        ROUTINE.
C              XLEN   :  THE LENGTH OF THE 2 MILE SCALE LINE IN INCHES.
C              X1     :  THE LEFT MOST X COORDINATE OF THE SCALE LINE.
C              X2     :  THE RIGHT MOST COORDINATE OF THE SCALE LINE.
C              X3     :  THE CENTER PT X COORDINATE OF THE SCALE LINE.
C              Y      :  THE COORDINATE PASSED TO THE BOUNDARY LINE
C                        ROUTINE.
C              Y1     :  THE Y COORDINATE OF THE LEFT MOST PART OF THE
C                        SCALE LINE.
C              Y2     :  THE COORDINATE OF THE POSITIVE END OF THE
C                        VERTICAL SCALE LINE TIC MARKS.
C              Y3     :  LIKE Y2 ONLY THE NEGATIVE END.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              NONE
C
C
C
```

```
C                         SUBROUTINE LABELS
C
C
C     OBJECTIVE:
C              TO DRAW THE AIRPORT NAME AND "LDN FOOTPRINT" AT THE TOP
C              OF THE PLOT; TO ESTABLISH VALUES, LATER USED BY RESTPLT,
C              TO COMPLETE THE PLOT LABELING.
C
C
C     PARAMETERS:
C              INPUT:
C                   CENTER :  THE CENTER X AND Y VALUE OF THE COMPASS
C                             ROSE.
C                   ITITLE :  THE AIRPORT NAME
C                   LDNST  :  THE STARTING LDN METRIC.
C     CALLING ROUTINE:
C              ROSE
C
C
C     SUBPROGRAMS USED:
C              NOTATE :  GRAPHICS ROUTINE USED TO DRAW CHARACTER STRINGS
C
C
C     FUNCTIONS USED:
C              FLOAT  :  INTEGER TO REAL CONVERSION
C              OR     :  LOGICAL OR OF 2 OR MORE ARGUMENTS.
C              SHIFT  :  LEFT CIRCULAR(LOGICAL)/RT ARITHMETIC WITH SIGN
C                        EXTENSION SHIFT.
C
C
C     LOCAL VARIABLE DICTIONARY:
C              HT     :  THE HEIGHT IN INCHES OF CHARACTERS TO BE
C                        NOTATED.
C              I      :  DO LOOP INDEX USED FOR FINDING A.P. NAME WIDTH.
C              ICHAR  :  COMPUTED CHARACTER PACKED INTO THE RANGE OF
C                        LDN CONTOUR TITLE.
C              IDUM   :  DUMMY LIST VARIABLE USED FOR DECODE.
C              IREM   :  VARIABLE USED TO DO DIGIT BY DIGIT ENCODE OF
C                        LDN METRIC VALUES FOR LDN RANGE TITLE.
C              ISTRIN :  CHARACTER STRING (2 WORDS) WITH HOLES FOR LOW
C                        AND HIGH LDN RANGE VALUES:
C                        " 55 DB TO 85 DB      " IS THE IDEAL FINAL FORM.
C              J      :  BACKWARD COUNTER FROM 80 AND 40  IN CONTRAST WITH I.
C              LINE   :  DECODE TARGET (8 WORDS ONTO 80) FOR A.P. TITLE.
C              LINE2  :  40-WORD ARRAY CONTAINING CASE TITLE
```

```
C             MET    :  THE ALPHA FORM OF THE LDN METRIC VALUE IN F5.1
C             METST  :  THE INTEGER FORM OF MET. (THE STARTING VALUE).
C             S      :  THE DISTANCE FROM THE LEADING EDGE OF A SYMBOL
C                       TO THE LEADING EDGE OF THE NEXT SYMBOL.
C             TOTW   :  THE TOTAL WIDTH OF A CHARACTER STRING IN INCHES
C             W      :  THE WIDTH OF ONE SYMBOL.
C             WADJ   :  WIDTH ADJUSTMENT FACTOR BASED ON SYMBOL HEIGHT.
C             X      :  THE X COORDINATE OF THE LOWER LEFT HAND CORNER
C                       OF THE 1ST CHARACTER OF A STRING TO BE DRAWN
C                       SUCH THAT IT IS CENTERED.
C             XMET   :  THE REAL FORM OF THE LDN STARTING CONTOUR.
C             Y      :  Y COORDINATE - SEE X.
C
C
C      COMMON VARIABLES:
C             /ITITL/
C                  ICASE1  :  4-WORD ARRAY CONTAINING CASE TITLE
C             /PLTINFO/
C                  CENT    : THE CENTER X AND Y VALUE OF THE COMPASS
C                            ROSE
C                  HT      : THE HEIGHT IN INCHES OF CHARACTERS TO BE
C                            NOTATED
C                  ISTRIN  : CHARACTER STRING (2 WORDS) USED TO NOTATE
C                            RANGE OF LDN VALUES
C                  S       : THE DISTANCE FROM THE LEADING EDGE OF A
C                            SYMBOL TO THE LEADING EDGE OF THE NEXT
C                            SYMBOL
C                  W       : REAL VARIABLE REPRESENTING THE WIDTH OF
C                            ONE SYMBOL
C
C
C      FILES USED:
C             NONE
C
C
```

```
C                          SUBROUTINE BOUND
C
C
C     OBJECTIVE:
C              TO DRAW THE PLOTTING BOUNDARY LINES AND ANNOTATE THE
C              COMPASS ROSE DIRECTION MNEUMONICS.
C
C
C     PARAMETERS:
C              INPUT:
C                   AXLEN  :  HALF THE LENGTH OF THE X,Y AXES.
C                   X      :  THE X PT OF ORIGIN FOR THE BOUNDARY LINE
C                             TO BE DRAWN.
C                   Y      :  Y COORDINATE(SEE X).
C                   INDEX  :  THE INDEX TO THE 3-LETTER DIRECTION
C                             MNEUMONICS TO BE NOTATED ON THIS CALL.
C                   IANGL  :  0 FOR VERTICAL BOUNDARY, 1 FOR HORIZONTAL.
C                   IHOL   :  THE ARRAY OF 3 LETTER COMPASS HEADING
C                             MNEUMONICS.
C
C
C     CALLING ROUTINE:
C              ROSE
C
C
C     SUBPROGRAMS USED:
C              CALPLT :  X,Y PEN MOVEMENT FOR GRAPHICS.
C              NOTATE :  NOTATES CHARACTER STRINGS ON GRAPHIC DISPLAY.
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              HT     :  CHARACTER HEIGHT.
C              THETA  :  ANGLE OF ORIENTATION FOR CHARACTER STRINGS.
C              TOTWDT :  TOTAL WIDTH OF 3 LETTER MNEUMONIC.
C              WADJ   :  CHARACTER WIDTH ADJUSTMENT FACTOR.
C              X4     :  THE DESTINATION PT FOR PLOT PEN IN DOWN POS.
C                        X COORD WHEN IANGL = 1, Y COORD WHEN IANGL = 0.
C              X6     :  X COORD OF LOWER LEFT HAND CORNER OF 1ST
C                        MNEUMONIC PLOTTED.
C              X7     :  SAME AS X6 BUT FOR 2ND MNEUMONIC PLOTTED(THERE
C                        ARE 2 MNEUMONICS FOR EACH BOUNDARY LINE.
C              X8     :  THE X COORDINATE FOR THE HORIZONTAL BOUNDARY
C                        LINE MNEUMONICS.
C              Y3     :  THE Y COORDINATE OF HORIZONTAL BOUNDARY LINE
C                        MNEUMONICS.
C              Z1     :  THE X,Y QUADRANT MIDPOINT (ONE FOURTH THE
C                        LENGTH OF THE X,Y AXES.
```

```
C
C                        SUBROUTINE PLTPOL
C
C
C     OBJECTIVE:
C             TO DRAW A POLYGON GIVEN THE X,Y POINTS AND A SCALE FACTOR
C
C
C     METHOD:
C             CONVERT THE SCALE FACTOR TO MILES UNITS AND DIVIDE ALL
C             DATA VALUES BY NEW SCALE FACTOR.  THEN USE MULTIPLE POINT
C             DRAW GRAPHICS ROUTINE.
C
C
C     PARAMETERS:
C             X      :  X POINTS FOR POLYGON TO BE PLOTTED.
C             Y      :  Y POINTS (SEE X).
C             N      :  NUMBER OF X,Y POINTS IN POLYGON.
C             SCALE  :  THE SCALE FACTOR.
C
C
C     CALLING ROUTINE:
C             POLY
C
C
C     SUBPROGRAMS USED:
C             DRAW   :  DRAWS A LINE GIVEN A SERIES OF SCALED DATA PTS.
C
C
C     FUNCTIONS USED:
C             NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C             DIV    :  SCALE FACTOR AFTER CONVERSION TO STATUTE MILES.
C             I      :  DO LOOP VARIABLE OVER RANGE OF POINTS.
C             XS     :  SCALED X POINTS.
C             YS     :  SCALED Y POINTS.
C
C
C     COMMON VARIABLES:
C             NONE
C
C
C     FILES USED:
C             NONE
C
C
```

```
C
C
C                         SUBROUTINE BLDARR
C
C
C     OBJECTIVE:
C              TO EVALUATE THE SITE II INPUT DECK, SUBDIVIDING ANY DECK
C              WITH MORE THAN 150 POINTS INTO 2 SITE II RUNS; TO PUT
C              END-OF-FILE MARKS AT THE END OF INPUT DECKS FOR EACH
C              SITE II RUN. ADDITIONALLY, TO COMPUTE VALUES FOR REGISTER
C              SETTINGS, WITH NCON INDICATING THE TOTAL NUMBER OF
C              SITE II RUNS, AND NSTCON PROVIDING AN INDEX TO THE LDN
C              VALUE OF THE FIRST CONTOUR FOUND.
C
C
C     METHOD:
C              FOR EACH SITE II RUN (INDICATED BY AN 'A' CARD), COUNT
C              THE CORRESPONDING NUMBER OF POINTS ON THE ASSOCIATED
C              'D' CARDS; STORE THE TOTAL NUMBER OF POINTS IN ARRAY
C              IPTS; FOR EACH RUN EXCEEDING 150 POINTS, THE ASSOCIATED
C              GROUPS OF 'C' AND 'D' CARDS ARE SUBDIVIDED.
C
C
C     PARAMETERS:
C              INPUT:
C                   ICASE: 8-WORD ARRAY WITH WORDS 5 THROUGH 8
C                          CONTAINING THE CASE NAME
C              OUTPUT:
C                   NCON: INTEGER VARIABLE, TO BE USED FOR REGISTER
C                         SETTING, INDICATING THE TOTAL NUMBER OF
C                         SITE II EXECUTIONS REQUIRED
C                   NSTCON: INTEGER VARIABLE, TO BE USED FOR REGISTER
C                         SETTING, THAT IS AN INDEX TO THE LDN VALUE
C                         OF THE FIRST CONTOUR FOUND
C
C
C     CALLING ROUTINE:
C                   AUPHS1 (MAIN PROGRAM)
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              NONE
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C              IA: INTEGER ARRAY USED TO CONTAIN THE CARD IMAGE OF A
C                   SITE II 'A' CARD
C              IARAY: 2-DIMENSION INTEGER ARRAY, WITH THE FIRST DIMEN-
C                   SION USED TO REPRESENT A SINGLE LDN CONTOUR VALUE,
C                   AND THE SECOND DIMENSION USED TO INDICATE THE NUM-
C                   BER OF POINTS IN A SINGLE POLYGON FOR THE ASSOCIATED
C                   LDN CONTOUR VALUE
C              IB: INTEGER ARRAY USED TO CONTAIN THE CARD IMAGE OF A
C                   SITE II 'B' CARD
C              IBLK: INTEGER ARRAY USED TO CONTAIN THE FIRST SITE II
C                   CARD IMAGE
C              ICHAR: INTEGER VARIABLE CONTAINING, IN THE LAST 6 BITS,
C                   THE FIRST 6 BITS OF A SITE II CARD IMAGE
C              ICHAR1: INTEGER VARIABLE CONTAINING, IN THE LAST 6 BITS,
C                   THE FIRST 6 BITS OF A SITE II CARD IMAGE
C              ICHAR2: INTEGER VARIABLE CONTAINING, IN THE LAST 6 BITS,
C                   THE FIRST 6 BITS OF A SITE II CARD IMAGE
C              ICOUNT: INTEGER VARIABLE USED TO INDICATE A SPECIFIC
C                   POLYGON ASSOCIATED WITH A SPECIFIC LDN CONTOUR
C              ICTR: INTEGER VARIABLE USED TO INDICATE THE NUMBER OF
C                   POINTS IN A PARTICULAR POLYGON
C              IFACT: INTEGER VARIABLE INDICATING THE TOTAL NUMBER OF
C                   LDN CONTOURS FOUND
C              IJ: INTEGER VARIABLE USED AS POLYGON INDEX
C              IJK: INTEGER VARIABLE USED AS LDN CONTOUR INDEX
C              IPTS: INTEGER ARRAY USED TO CONTAIN THE TOTAL NUMBER OF
C                   POINTS FOR EACH LDN CONTOUR
C              I1: INTEGER VARIABLE, CONTAINING IN THE LAST 6 BITS,
C                   THE FIRST 6 BITS OF A SITE II CARD IMAGE
C              I5A: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              I5B: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              I6A: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              I6B: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              I7A: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              I8A: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              I8B: INTEGER USED AS TEMP. STORAGE FOR PART OF CASE TITLE
C              LINE: INTEGER ARRAY USED TO CONTAIN A SITE II CARD
C                   IMAGE
C              SPACE: INTEGER ARRAY USED TO CONTAIN THE FIRST FOUR
C                   WORDS OF A SITE II CARD IMAGE
C
```

```
C
C     COMMON VARIABLES:
C             NONE
C
C
C     FILES USED:
C             INPUT:
C                 NONE
C             OUTPUT:
C                 TAPE1 - SEQUENTIAL FILE CONTAINING SITE II INPUT
C                     DECK, EACH DESCRIBING 150 POINTS OR LESS,
C                     WITH INPUT DECKS SEPARATED BY END-OF-FILE MARKS
C             SCRATCH:
C                 TAPE4 - SEQUENTIAL FILE CONTAINING CARD IMAGES OF
C                     UNPROCESSED SITE II INPUT DECKS
C
C
```

```
C                         SUBROUTINE RESTPLT
C
C
C     OBJECTIVE:
C              SUBROUTINE RESTPLT PLOTS A LABEL INDICATING THE RANGE
C              OF DB VALUES WHOSE CONTOUR POINTS ARE PLOTTED; ADDITION-
C              ALLY, IF MORE THAN ONE CONTOUR IS PLOTTED, THE STEP SIZE
C              IS NOTATED ON THE PLOT
C
C
C     PARAMETERS:
C              INPUT:
C                   FACT  : THE LENGTH OF THE POSITIVE X AND Y AXES IN
C                           INCHES
C                   MET   : NOISE METRIC IN CHARACTER FORM
C                   RUNCNT: INTEGER VARIABLE USED TO COUNT CONTOURS
C              OUTPUT:
C                   NONE
C
C
C     CALLING ROUTINE:
C              AUPHS1
C
C
C     SUBPROGRAMS USED:
C              CALPLT  : LRCGOSF ROUTINE USED TO RESET ORIGIN
C              NOTATE  : LRCGOSF ROUTINE USED TO PLOT A CHARACTER
C                        STRING
C
C
C     FUNCTIONS USED:
C              AND   : STANDARD FTN AND-ING FUNCTION
C              OR    : STANDARD FTN OR-ING FUNCTION
C              SHIFT : STANDARD FTN SHIFT-ING FUNCTION
C
C
C     LOCAL VARIABLE DICTIONARY:
C              CENTER : REAL VARIABLE REPRESENTING THE CENTER X AND Y
C                       VALUE OF THE COMPASS ROSE
C              ICHAR  : VARIABLE USED IN THE FORMATION OF THE UPPERMOST
C                       LDN CONTOUR VALUE PLOTTED
C              IREM   : VARIABLE USED IN THE FORMATION OF THE UPPERMOST
C                       LDN CONTOUR VALUE PLOTTED
C              ITEMP1 : VARIABLE USED IN THE FORMATION OF CHARACTER
C                       STRING WHEN ONLY ONE CONTOUR IS PLOTTED
C              ITEMP2 : VARIABLE USED TO STORE THE INTEGER VALVE OF
C                       THE UPPERMOST LDN VALUE
C              TOTW   : REAL VARIABLE REPRESENTING THE LENGTH IN INCHES
C                       OF THE CHARACTER STRING TO BE PLOTTED
```

```
C              X       : REAL VARIABLE REPRESENTING THE X-COORDINATE OF
C                        THE STARTING POINT OF THE CHARACTER STRING TO
C                        BE NOTATED
C              Y       : REAL VARIABLE REPRESENTING THE Y-COORDINATE OF
C                        THE STARTING POINT OF THE CHARACTER STRING TO
C                        BE NOTATED
C
C
C      COMMON VARIABLES:
C              /PLTINFO/
C                     CENT   : THE CENTER X AND Y VALUE OF THE COMPASS
C                              ROSE
C                     HT     : THE HEIGHT IN INCHES OF CHARACTERS TO BE
C                              NOTATED
C                     ISTRIN : CHARACTER STRING (2 WORDS) USED TO NOTATE
C                              RANGE OF LDN VALUES
C                     S      : THE DISTANCE FROM THE LEADING EDGE OF A
C                              SYMBOL TO THE LEADING EDGE OF THE NEXT
C                              SYMBOL
C                     W      : REAL VARIABLE REPRESENTING THE WIDTH OF
C                              ONE SYMBOL
C
C
C      FILES USED:
C              INPUT:
C                    NONE
C              OUTPUT:
C                    NONE
C              SCRATCH:
C                    NONE
C
```

```
C                           PROGRAM AUREPT
C
C
C     OBJECTIVE:
C              PROGRAM AUREPT CONSOLIDATES THE DEMOGRAPHIC VARIABLES
C              FROM A SERIES OF SITE II DEMOGRAPHIC PROFILE REPORTS FOR
C              AN AIRPORT COMMUNITY WITHIN THE 65 DB LDN NOISE CONTOUR.
C              TEN PRINTED REPORTS ARE GENERATED; ONE REPORT FOR EACH
C              OCTANT OF THE IMPACTED AREA, A SUMMARY OF ALL OCTANT
C              REPORTS AND A NOISE IMPACT SUMMARY FOR THE IMPACTED AREA.
C
C
C     METHOD:
C              INPUT TO PROGRAM AUREPT CONSISTS OF A SITE II
C              DEMOGRAPHIC PROFILE REPORT FOR EACH OF A SERIES OF
C              POLYGONAL AREAS(PA).  EACH PA REPRESENTS THE AREA
C              ENCLOSED BY THE COORDINATES OF A CONSTANT LEVEL NOISE
C              CONTOUR INTERSECTED WITH TWO COMPASS ROSE OCTANT LINES.
C              THE DEMOGRAPHIC VARIABLES FROM THE PROFILE REPORTS ARE
C              SUMMED FOR EACH OCTANT OF EACH CONTOUR.  DIFFERENCES ARE
C              CALCULATED BETWEEN EQUIVALENT OCTANTS OF ADJACENT
C              CONTOURS SUCH THAT DEMOGRAPHIC VARIABLES ARE STORED FOR
C              THE AREAS(BANDS) BETWEEN EACH CONTOUR FOR EACH OCTANT.
C              THE DEMOGRAPHIC VARIABLES ARE ACCUMULATED IN A
C              3-DIMENSIONAL ARRAY SUCH THAT EACH PLANE REPRESENTS AN
C              OCTANT WITH THE 9TH PLANE REPRESENTING THE SUM OF ALL
C              OCTANTS.  THE ROWS OF EACH PLANE REPRESENT THE
C              DEMOGRAPHIC VARIABLES WHILE THE COLUMNS REPRESENT THE
C              CONTOUR BANDS.  THE AGGREGATED POPULATION DATA AS SUMMED
C              AND DIFFERENCED FROM THE DEMOGRAPHIC DATA IS USED TO
C              CALCULATE A NOISE IMPACT SUMMARY WHICH INCLUDES THE
C              CALCULATION OF A LEVEL WEIGHTED POPULATION, NOISE IMPACT
C              INDEX, EQUIVALENT NOISE LEVEL, PERCENT HIGHLY ANNOYED AND
C              POPULATION HIGHLY ANNOYED.
C
C
C     SUBPROGRAMS USED:
C              BLDTAB :  READS THE PA REPORTS, CALCULATES THE BAND DATA
C                        AND STORES IT IN THE 3-DIMENSIONAL TABLE.
C              CHART  :  OUTPUTS THE OCTANT REPORTS ON PRINTER PAPER
C                        USING THE CONTENTS OF THE 3-DIMENSIONAL TABLE.
C              HEADER :  PERFORMS PAGE EJECT AND PRINTS PAGE HEADINGS
C                        AND TITLES FOR THE OCTANT REPORTS.
C              SUMARY :  CALCULATES AND PRINTS THE VARIABLES FOR THE
C                        NOISE IMPACT SUMMARY.
C
C
C     FUNCTIONS USED:
C              NONE
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C               ALINE  :  2-DIMENSIONAL ARRAY USED TO STORE AREAS
C                         OF 65, 75, 85 DB CONTOURS.
C               GR2    :  USER-DESIGNATED GROWTH RATE
C               I      :  USED AS A DO LOOP INDEX IN 50 LOOP AND 100 LOOP
C                         IN THE 50 LOOP IT INDEXES THE ARRAY TABLE FOR
C                         PRESET TO ZEROES AND IN THE 100 LOOP IT IS THE
C                         OCTANT COUNTER.
C               ICASE  :  60-WORD ARRAY CONTAINING CASE TITLE
C               IR3    :  VALUE OF REGISTER 3, AS DETERMINED BY GETCON
C               ISIG1  :  FLAG USED TO INDICATE THE ABSENCE OF THE 75 DB
C                         (OR GREATER) CONTOUR
C               ISIG2  :  FLAG USED TO INDICATE THE ABSENCE OF THE 65 DB
C                         (OR GREATER) CONTOUR
C               IYEAR  :  USER-DESIGNATED YEAR FOR POPULATION UPDATES
C               J      :  USED AS A DO LOOP INDEX IN 75 LOOP.  IT IS THE
C                         COLUMN(BAND) POINTER IN THE ARRAY TABLE.
C               KADRS  :  AN 80 WORD ARRAY THAT STORES THE AIRPORT
C                         ADDRESS IN 80R1 FORMAT.
C               KEMPTY :  A COUNTER WHOSE VALUE DETECTS THE PRESENCE OF
C                         AN OCTANT WITH NO POPULATION IN ANY BAND.
C               LDNS   :  A 8 WORD ARRAY THAT STORES THE ASCENDING LDN
C                         VALUES FOR EACH CONTOUR.  DEFINED IN SUBROUTINE
C                         BLDTAB.
C               MINUS  :  INTEGER VARIABLE USED FOR LANDUSE COUNTER-
C                         MEASURES TO DETERMINE DB INSULATION FACTOR
C               NAME   :  AN 80 WORD ARRAY THAT STORES THE AIRPORT NAME
C                         IN 80R1 FORMAT.
C               NCON   :  THE INDEX TO THE STARTING LDN CONTOUR.  DEFINED
C                         IN SUBROUTINE BLDTAB BY SAMPLING THE JOB
C                         CONTROL REGISTER, R2.
C               TABLE  :  THE 3-DIMENSIONAL TABLE BUILT UP BY SUBROUTINE
C                         BLDTAB.
C     COMMON BLOCK CROSS-REFERENCE LIST:
C               NONE
C
C
C     COMMON VARIABLES:
C               NONE
C
```

```
C
C     FILES USED:
C             INPUT:
C                  TAPE5 - SEQUENTIAL INPUT FILE CONSISTING OF ALL THE
C                          SITE II PRINTED OUTPUT. FORMATTED MODE.
C                  TAPE1 - SEQUENTIAL INPUT FILE CONSISTING OF AIRPORT
C                          DESCRIPTIVE DATA. FORMATTED MODE.
C                      CARDS 1 - 6: INFORMATION USED BY ALAMO PROGRAMS THAT
C                                   SHARE THIS FILE
C                      CARD 7: LATITUDE,LONGITUDE,DISPLACEMENTS.
C                              COL1 - COL2 = LATITUDE DEGREES
C                              COL4 - COL5 = LATITUDE MINUTES
C                              COL7 - COL8 = LATITUDE SECONDS
C                              COL11 - COL13 = LONGITUDE DEGREES
C                              COL15 - COL16 = LONGITUDE MINUTES
C                              COL18 - COL19 = LONGITUDE SECONDS
C                              COL25         = N OR S (NORTH/SOUTH)
C                              COL26 - COL30 = F5.2 WITH NO SIGN
C                              COL32         = E OR W (EAST/WEST)
C                              COL33 - COL37 = F5.2 WITH NO SIGN
C                      CARD 8: 2F10.2 - X AND Y AXES TRANSLATION
C                              CONSTANTS.
C                      CARD 9: COL1 - COL5: F5.2 - SCALE FACTOR FOR CONTOUR
C                              GRAPHIC EQUALS HALF THE LENGTH OF X AND Y AXES
C                              COL7 - COL10: YEAR FOR POPULATION UPDATES
C                              COL11 - COL16: USER DESIGNATED GROWTH RATE
C                              EQUALS HALF THE LENGTH OF X AND Y AXES.
C                      CARD 10: AIRPORT NAME IN 8A10 FORMAT.
C                      CARD 11: AIRPORT ADDRESS IN 8A10 FORMAT.
C             OUTPUT:
C                  TAPE6 - LINE PRINTER FILE FOR ALL 10 REPORTS.
C                  TAPE2 - LINE PRINTER FILE FOR NOISE IMPACT SUMMARY
C                          REPORT ONLY
C             SCRATCH:
C                  NONE
C
C
```

```
C                    SUBROUTINE RDREPT
C
C
C      OBJECTIVE:
C              TO FIND AND READ THE NEXT SITE II POLYGON REPORT ON TAPE5
C
C      METHOD:
C              RDREPT READS TAPE5, LINE BY LINE, UNTIL IT FINDS THE NEXT
C              OCCURRENCE OF THE CHARACTER STRING " PROFILE R" STARTING
C              IN COLUMN 41.  WHEN THE STRING IS FOUND RDREPT WILL BE
C              POSITIONED AT THE TOP OF A SITE II DEMOGRAPHIC PROFILE
C              REPORT.  THE DEMOGRAPHIC VARIABLES FOR THE NEXT POLYGON
C              ARE THEN READ THROUGH A SERIES OF FORMATTED READS.
C
C      ASSUMPTIONS:
C              RDREPT ASSUMES THAT THE SITE II REPORTS ARE IN THE PROPER
C              ORDER FOR LATER PROCESSING.  IT MAKES NO ATTEMPT TO
C              RECOGNIZE EITHER THE OCTANT NUMBER OR THE LDN VALUE.
C
C      PARAMETERS:
C              INPUT:
C                   GR2    :  USER-DESIGNATED GROWTH RATE
C                   IYEAR  :  USER-DESIGNATED YEAR OF POPULATION UPDATE
C              OUTPUT:
C                   IR3    :  VALUE OF REG. 3 AS DETERMINED BY GETCON
C                   ISIG1  :  FLAG USED TO INDICATE ABSENCE OF 75 DB
C                             (OR GREATER) CONTOUR
C                   ISIG2  :  FLAG USED TO INDICATE ABSENCE OF 65 DB
C                             (OR GREATER) CONTOUR
C
C      CALLING ROUTINE:
C              BLDTAB
C
C      SUBPROGRAMS USED:
C              GETCON : COMPASS ROUTINE THAT SAMPLES REGISTERS
C
C
C      FUNCTIONS USED:
C              EOF:      END OF FILE CHECK ON TAPE5.
C
C      LOCAL VARIABLE DICTIONARY:
C              I      :  USED AS INDEX VARIABLE IN IMPLIED DO I/O LISTS.
C              IR1    :  INTEGER VARIABLE REPRESENTING VALUE OF REGISTER 1
C              IR2    :  INTEGER VARIABLE REPRESENTING VALUE OF REGISTER 2
C              IR3    :  INTEGER VARIABLE REPRESENTING VALUE OF REGISTER 3
C              KEY    :  STORES 10 CHARACTER STRING WHICH UNIQUELY
C                        IDENTIFIES A SITE II DEMOGRAPHIC PROFILE REPORT
```

```
C     COMMON VARIABLES:
C             /COMM/
C                   ACHH    :  THE NUMBER OF HOUSEHOLDS WITH
C                              AIR CONDITIONING.
C                   AREA    :  THE AREA IN SQUARE MILES OF THE POLYGON
C                              BEING READ.
C                   COL16P  :  NOT USED
C                   EDUC    :  5 WORD VECTOR STORING THE EDUCATED ADULTS
C                              GREATER THAN 25 COLUMN INFO AS FOLLOWS:
C                              EL 1    0 - 8 GRADES
C                              EL 2    9 - 11 GRADES
C                              EL 3        12 TH GRADE
C                              EL 4   13 - 15 GRADES
C                              EL 5   16+     GRADES
C                   FAMPOP  :  THE NUMBER OF PEOPLE WITH FAMILY STATUS.
C                   FEM     :  6 WORD VECTOR STORING THE NUMBER OF WOMEN
C                              IN THE FOLLOWING AGE CATEGORIES:
C                              EL 1   18 - 20
C                              EL 2   21 - 29
C                              EL 3   30 - 39
C                              EL 4   40 - 49
C                              EL 5   50 - 64
C                              EL 6   65+
C                   FMIN    :  7 WORD VECTOR STORING THE NUMBER OF PEOPLE
C                              IN THE FOLLOWING FAMILY INCOME BRACKETS:
C                              EL 1   $ 0 - 5    (THOUSANDS)
C                              EL 2   $ 5 - 7
C                              EL 3   $ 7 - 10
C                              EL4    $10 - 15
C                              EL5    $15 - 25
C                              EL6    $25 - 50
C                              EL7    $50+
C                   HOMVAL  :  7 WORD VECTOR STORING THE NUMBER OF PEOPLE
C                              IN THE FOLLOWING HOME VALUE BRACKETS:
C                              EL1    $ 0 - 10    (THOUSANDS)
C                              EL2    $10 - 15
C                              EL3    $15 - 20
C                              EL4    $20 - 25
C                              EL5    $25 - 35
C                              EL6    $35 - 50
C                              EL7    $50+
C                   IOCT    :  THE OCTANT NUMBER OF THE POLYGON BEING
C                              READ.
C                   KEOF    :  END OF FILE FLAG - SET TO 1 TO INDICATE
C                              AN EOF WAS ENCOUNTERED.  SENSED BY THE
C                              CALLING ROUTINE.
C                   LINE    :  AN 8 WORD VECTOR FOR STORING 80 CHARACTER
C                              LINE IMAGES OF THE SITE II REPORTS.
C                   MALE    :  6 WORD VECTOR STORING MALE AGE INFO AS
C                              DESCRIBED UNDER VARIABLE FEM.
```

```
C                   MGRPRO :  9 WORD VECTOR STORING THE NUMBER OF PEOPLE
C                             IN THE FOLLOWING OCCUPATIONAL CATEGORIES:
C                             EL1    MANAGERIAL/PROFESSIONAL
C                             EL2    SALES
C                             EL3    CLERICAL
C                             EL4    CRAFT
C                             EL5    OPERATIVES
C                             EL6    LABORER
C                             EL7    FARM
C                             EL8    SERVICE
C                             EL9    PRIVATE
C                   NOHH   :  THE NUMBER OF HOUSEHOLDS.
C                   POP70  :  THE 1970 CENSUS POPULATION FOR THIS POLY.
C                   POP81  :  THE 1981 CENSUS POPULATION FOR THIS POLY.
C                   SNGDWL :  THE NUMBER OF PEOPLE IN SINGLE FAMILY
C                             DWELLINGS.
C                   TOTOWN :  THE TOTAL NUMBER OF HOMEOWNERS.
C                   TOTRNT :  NOT USED.
C                   TVHH   :  THE NUMBER OF HOUSEHOLDS WITH TELEVISION.
C                   XLDN   :  THE NOISE CONTOUR METRIC (DBLDN) FOR THIS
C                             POLYGON.
C                   ZERO   :  A FLAG SET TO 1 TO INDICATE A ZERO
C                             POPULATION POLYGON.
C
C
C     FILES USED:
C              INPUT:
C                   TAPE5 - SEQUENTIAL INPUT FILE CONTAINING ALL OF THE
C                           SITE II OUTPUT FOR AN ALAMO CASE RUN.  THIS
C                           CONSISTS OF A REPITITION OF THE FOLLOWING:
C                           1. SITE II REFLECTION OF A,B,C AND D CARDS
C                              FOR A PARTICULAR RUN.
C                           2. REFLECTION OF THE SORT/MERGE DIRECTIVES
C                              USED BY SITE II.
C                           3. SITE II DEMOGRAPHIC PROFILE REPORTS FOR
C                              INPUT DESCRIBED IN 1 ABOVE.
C
C
```

```
C
C
C                    SUBROUTINE BLDTAB
C
C
C     OBJECTIVE:
C              TO BUILD A 3-DIMENSIONAL TABLE WHICH STORES THE VALUES OF
C              THE 16 DEMOGRAPHIC VARIABLES TO BE REPORTED FOR EACH
C              OCTANT OF EACH LDN BAND.
C
C
C     METHOD:
C              BLDTAB CALLS SUBROUTINE RDREPT TO READ EACH SUCCESSIVE
C              POLYGON REPORT.  RDREPT DEFINES AND REDEFINES THE
C              DEMOGRAPHIC VARIABLES IN NAMED COMMON BLOCK, COMM.
C              BLDTAB ACCUMULATES THE VALUES FOR ALL POLYGONS OF EACH
C              OCTANT FOR EACH LDN VALUE AND STORES THE ACCUMULATIONS IN
C              LOCAL VARIABLES.  WHEN ALL POLYGONS HAVE BEEN READ AND
C              VALUES ARE LOCALLY STORED, BLDTAB BEGINS TO BUILD THE
C              3-DIMENSIONAL TABLE BY FINDING THE DIFFERENCES OF THE
C              ACCUMULATED VALUES OF THE DEMOGRAPHIC VARIABLES BETWEEN
C              LDN CONTOURS.  THIS IS DONE FOR EACH OCTANT.  THE ROW
C              DIMENSION OF THE TABLE CORRESPONDS TO THE DEMOGRAPHIC
C              VARIABLES; THE COLUMN DIMENSION OF THE TABLE CORRESPONDS
C              TO THE LDN CONTOUR BANDS AND THE PLANE DIMENSION
C              CORRESPONDS TO THE 8 COMPASS ROSE OCTANTS.  THE 9TH PLANE
C              REPRESENTS A SUMMARY OF ALL THE OCTANTS.  THE CAPACITY OF
C              THE TABLE ACCOUNTS FOR THE FOLLOWING BANDS:
C              65-70,70-75,75-80, 80-85 AND OVER 85.
C              IT IS POSSIBLE THAT LOW END AND/OR TOP END LDN CONTOURS
C              WILL BE MISSING.  IN ANY CASE, THE BANDS WILL BE STORED
C              IN THE UPPER DIMENSION OF THE COLUMNS OF THE TABLE.  THIS
C              MEANS THAT COLUMN 5 WILL ALWAYS BE THE "OVER XX" BAND
C              WHERE XX CORRESPONDS TO THE HIGHEST LDN CONTOUR FOUND BY
C              THE INTEGRATED NOISE MODEL.  BLDTAB SAMPLES THE JOB
C              CONTROL REGISTER, R2 FOR THE STARTING COLUMN INDEX TO
C              ACCOUNT FOR MISSING CONTOURS.  R2 IS SET BY A SEPARATE
C              PROGRAM WHICH DEFINES THE POLYGON AREAS AND THEREFORE
C              KNOWS THE LDN RANGE OF VALUES.
C
C     RESTRICTIONS AND ASSUMPTIONS:
C              BLDTAB ASSUMES THAT:
C                   1.  REGISTER R2 HAS BEEN SET PREVIOUS TO PROGRAM
C                       STARTUP.
C                   2.  THE POLYGON REPORTS ARE IN ASCENDING ORDER OF
C                       LDN VALUE.
```

```
C       PARAMETERS:
C                 INPUT:
C                      GR2    :  USER-DESIGNATED GROWTH RATE
C                      IYEAR  :  USER-DESIGNATED YEAR OF POPULATION UPDATE
C                 OUTPUT:
C                      ALINE  :  2-DIMENSIONAL ARRAY CONTAINING AREAS OF
C                                65, 75, 85 DB CONTOURS.
C                      IR3    :  VALUE OF REG. 3 AS DETERMINED BY GETCON
C                      ISIG1  :  FLAG USED TO INDICATE ABSENCE OF 75 DB
C                                (OR GREATER) CONTOUR
C                      ISIG2  :  FLAG USED TO INDICATE ABSENCE OF 65 DB
C                                (OR GREATER) CONTOUR
C                      TABLE  :  THE 3 DIMENSIONAL TABLE - TABLE(16,5,9)
C                                EACH PLANE REPRESENTS AN OCTANT EXCEPT THE
C                                9TH PLANE WHICH REPRESENTS THE SUMMARY OF
C                                ALL THE OCTANTS.  THE 5 COLUMNS OF EACH
C                                PLANE CORRESPOND TO THE CONTOUR BANDS AS
C                                FOLLOWS:
C                                65-70 70-75 75-80 80-85 85+
C                                EACH ROW CORRESPONDS TO A DEMOGRAPHIC
C                                VARIABLE AS FOLLOWS:
C                                1.  SELF-NOISE (AMBIENT NOISE IN DBLDN)
C                                2.  IMPACTED POPULATION
C                                3.  AREA IN SQUARE KILOMETERS
C                                4.  TOTAL POPULATION PER SQUARE KILOMETER
C                                5.  AVERAGE GROWTH RATE, APR
C                                6.  PERCENT FAMILY POPULATION
C                                7.  AVERAGE AGE, ADULTS OVER 17
C                                8.  PERCENT AGE OVER 65
C                                9.  PERCENT OF PEOPLE WITH 16+ YEARS EDUC.
C                                10. PERCENT MANAGER/PROFESSIONALS
C                                11. AVERAGE FAMILY INCOME
C                                12. PERCENT SINGLE FAMILY DWELLINGS
C                                13. PERCENT HOME OWNERS
C                                14. AVERAGE HOME VALUE
C                                15. PERCENT HOUSEHOLDS WITH AIRCONDITIONER
C                                16. PERCENT HOUSEHOLDS WITH TV
C                      LDNS   :  A 6 WORD ARRAY WHICH STORES THE 5
C                                POSSIBLE LDN CONTOUR VALUES INTENDED TO BE
C                                65 THROUGH 85 IN 5DB INTERVALS. THE 6TH
C                                WORD STORES THE MAXIMUM LDN CONTOUR FOUND
C                                WHICH WILL BE THE CONTENTS OF WORD 5.
C                      ICON   :  STORAGE FOR THE VALUE OF JOB CONTROL
C                                REGISTER, R2.  DEFINED BY COMPASS
C                                SUBROUTINE GETCON.
```

```
C
C     CALLING ROUTINE:
C             AUREPT
C
C
C     SUBPROGRAMS USED:
C             GETCON :  READS JOB CONTROL REGISTERS.
C             RDREPT :  READS THE NEXT POLYGON REPORT ON THE INPUT FILE
C
C
C     FUNCTIONS USED:
C             ALOG10 :  CALCULATES THE LOGARITHM, BASE 10
C
C
C     LOCAL VARIABLE DICTIONARY:
C             AC     :  AN 8X6 MATRIX WHOSE ROWS CORRESPOND TO THE 8
C                       OCTANTS AND WHOSE COLUMNS CORRESPOND TO THE 5
C                       POSSIBLE LDN VALUES.  COLUMN 6 WILL ALWAYS BE
C                       ZEROES TO ALLOW FOR THE CALCULATION OF OVER 85
C                       VALUES.  AC ACCUMULATES THE AIR CONDITIONER
C                       DATA.
C             ALLGR  :  REAL ARRAY USED TO STORE GROWTH RATES OF THE
C                       OCTANTS OF THE CONTOURS
C             AVGAGE :  A 3-DIMENSIONAL ARRAY WHOSE ROWS CORRESPOND TO
C                       THE 6 AGE CATEGORIES; COLUMNS CORRESPOND TO THE
C                       8 OCTANTS AND PLANES CORRESPOND TO THE LDN
C                       VALUES.
C             AVGFIN :  A 3-DIMENSIONAL ARRAY WHOSE ROWS CORRESPOND TO
C                       THE 7 FAMILY INCOME CATEGORIES; COLUMNS
C                       CORRESPOND TO THE 8 OCTANTS AND PLANES
C                       CORRESPOND TO THE LDN VALUES.
C             AVGHMV :  A 3-DIMENSIONAL ARRAY WHOSE ROWS CORRESPOND TO
C                       THE 7 HOME VALUE CATEGORIES; COLUMNS CORRESPOND
C                       TO THE 8 OCTANTS AND PLANES CORRESPOND TO THE
C                       LDN VALUES.
C             BANDGRO :  REAL ARRAY REPRESENTING BAND GROWTH RATES WITH
C                        THE FINAL 8 OCTANT VARIABLES REPRESENTING THE
C                        INNER CONTOUR (8 OCTANTS, 5 BANDS, WHERE LAST
C                        BAND IS "OVER XX"
C             DIF    :  TEMPORARY VARIABLE USED TO ACCUMULATE
C                       DIFFERENCES THAT ARE MULTIPLIED BY A FACTOR.
C             DIFHHS :  TEMPORY USED FOR DIFFERENCING THE NO.OF
C                       HOUSEHOLDS.
```

```
C                 DIF1    :  TEMPORARY FOR DIFFERENCING THE AVG. HOME VALUES
C                 DIF2    :  TEMPORARY FOR DIFFERENCING THE YRS EDUCATION.
C                 DIF3    :  TEMPORARY FOR DIFFERENCING THE OCCUPATIONS.
C                 DIF4    :  TEMPORARY FOR DIFFERENCING THE YRS EDUCATION
C                            OVER 16.
C                 DIF5    :  TEMPORARY FOR DIFFERENCING THE MANAGER/PROF.
C                 DIF6    :  TEMPORARY FOR DIFFERENCING THE SINGLE DWELLINGS
C                 DIF7    :  TEMPORARY FOR DIFFERENCING THE AC UNITS.
C                 DIF8    :  TEMPORARY FOR DIFFERENCING THE TVS.
C                 DNSITY  :  TEMPORARY FOR COMPUTING POPULATION DENSITY.
C                 DWL1    :  ACCUMULATION ARRAY FOR SINGLE DWELLING DATA;
C                            ROWS ARE OCTANTS, COLUMNS ARE LDN VALUES.
C                 ED16    :  3-DIMENSIONAL ARRAY WHICH ACCUMULATES THE
C                            EDUCATIONAL CATEGORIES; ROW 1 IS 16YRS+ AND
C                            ROW 2 IS ALL CATEGORIES, COLUMNS ARE
C                            OCTANTS, PLANES ARE LDN VALUES.
C                 FACT    :  ARRAY OF MULTIPLYING FACTORS USED FOR COMPUTING
C                            THE AVERAGE AGE DATA; FOR EXAMPLE, THE 1ST
C                            ELEMENT IS 19 WHICH CORRESPONDS TO THE AVERAGE
C                            AGE OF THE 1ST AGE CATEGORY (18-20) BEING
C                            SUMMED FOR AVERAGING.
C                 FACTHM  :  SIMILAR TO FACT ABOVE BUT USED FOR AVERAGING
C                            THE HOME VALUES.
C                 FACTIN  :  SIMILAR TO FACT ABOVE BUT USED FOR AVERAGING
C                            THE FAMILY INCOMES.
C                 FPOP    :  TEMPORARY USED FOR DIFFERENCING THE FAMILY
C                            POPULATION.
C                 GRATE   :  REAL VARIABLE REPRESENTING THE GROWTH RATE,
C                            EITHER EXTRACTED FROM ARRAY BANDGRO, OR
C                            USER-DESIGNATED; THIS VARIABLE IS THE GROWTH
C                            RATE USED TO PROJECT A CORRESPONDING POPULATION
C                 GRIOCT  :  REAL VARIABLE REPRESENTING THE GROWTH RATE FOR
C                            A PARTICULAR OCTANT
C                 GROTH   :  REAL ARRAY USED TO STORE THE GROWTH RATES FOR
C                            AN OCTANT WITH MULTIPLE POLYGONS
C                 GR9     :  REAL VARIABLE, REPRESENTING THE GROWTH RATE FOR
C                            THE "ALL OCTANTS" CASE, COMPUTED USING THE ORIGINAL
C                            CUMULATIVE POPULATION AND THE GROWN CUMULATIVE
C                            POPULATION
C                 HHS     :  TEMPORARY USED FOR ACCUMULATING THE HOUSEHOLD
C                            DATA; ROWS ARE OCTANTS, COLUMNS ARE LDN VALUES.
C                 HMVALT  :  TEMPORARY USE FOR TOTALING THE HOME VALUES.
C                 I       :  GENERAL PURPOSE DO LOOP INDEX.
C                 IALLPOP:   INTEGER ARRAY USED TO STORE POPULATION VALUES OF
C                            THE OCTANTS OF THE CONTOURS, NEEDED TO COMPUTE
C                            BAND GROWTH RATES
C                 ICT     :  COUNTER USED AS INDEX TO ACCUMULATE GROWTH RATES
C                            AND AND POPULATIONS IN SINGLE OCTANT
C                 IDIF    :  INTEGER VARIABLE USED FOR TEMPORARY STORAGE TO
C                            REPRESENT THE NUMBER OF PEOPLE FOR A PARTICULAR
C                            OCTANT AND A PARTICULAR CONTOUR BAND
```

```
C               IGRPOP :  INTEGER ARRAY USED TO STORE THE POPULATIONS OF
C                         AN OCTANT WITH MULTIPLE POLYGONS
C               IOCT2  :  INTEGER VARIABLE USED TO IDENTIFY OCTANT, THUS
C                         CAN ACCOUNT FOR MULTIPLE POLYGONS  IN 1 OCTANT
C               IOCTSUM:  INTEGER VARIABLE REPRESENTING THE TOTAL VALUE
C                         OF THE POPULATION IN A GIVEN OCTANT
C               ITEMP  :  INTEGER VARIABLE USED TO INDEX INTO ARRAY IALLPOP
C                         TO FIND POPULATION OF INNER CONTOUR
C               J      :  DO LOOP INDEX FOR 600 LOOP( OCTANT INDEX ).
C               JJ     :  INDEX USED INTO ARRAY ALINE, USED TO STORE
C                         AREA INFORMATION
C               JJJ    :  INDEX INTO ARRAY ALINE, USED TO STORE AREA
C                         INFORMATION
C               JPTR   :  LDN VALUE INDEX.
C               K      :  GENERAL PURPOSE DO LOOP INDEX
C               KK     :  INDEX INTO ARRAY POPDEN, USED TO EXTRACT AREA
C                         INFORMATION
C               KDUM1  :  DUMMY PARAMETER FOR GETCON ROUTINE.
C               KDUM2  :  DUMMY PARAMETER FOR GETCON ROUTINE.
C               LDN    :  INTEGER REPRESENTATION FOR THE CURRENT LDN
C                         VALUE.
C               LOC    :  INTEGER VARIABLE USED TO LOCATE STORAGE OF
C                         CONTOUR AREAS, ON AN OCTANT BY OCTANT BASIS
C               N      :  INTEGER VARIABLE REPRESENTING THE NUMBER
C                         OF YEARS OF POPULATION UPDATE
C               POP    :  TEMPORARY USED FOR DIFFERENCING THE POPULATION
C                         DENSITIES.
C               POPDEN :  3-DIMENSIONAL ARRAY USED FOR ACCUMULATING THE
C                         1981 POPULATIONS AND CORRESPONDING AREAS; COL 1
C                         1981 POPULATION, COL 2 IS AREA, ROWS ARE
C                         OCTANTS AND COLUMNS ARE LDNS.
C               POPIMP :  ARRAY FOR ACCUMULATING THE IMPACTED POPULATIONS
C                         ROWS ARE OCTANTS AND COLUMNS ARE LDNS.
C               POPO   :  REAL VARIABLE USED FOR DIFFERENCING POPULATION
C                         VALUES
C               POP1   :  REAL VARIABLE USED TO STORE THE POPULATION OF A
C                         POLYGON WITHIN AN OCTANT OF A CONTOUR
C               PRATIO :  TEMPORARY FOR CALCULATING THE POPULATION RATIOS
C               SAREA  :  TEMPORARY FOR SUM OF AREAS.
C               SHHS   :  TEMPORARY FOR SUM OF HOUSEHOLDS.
C               SHMV      TEMPORARY FOR SUM OF HOME VALUES.
C               SPOP   :  TEMPORARY USED FOR SUMMING POPULATIONS.
C               SPOPO  :  REAL VARIABLE USED TO STORE SUMMED POPULATIONS;
C                         CONTAINS THE SUMMED POPULATIONS WITHOUT APPLI-
C                         CATION OF THE GROWTH RATE
C               SPOP70 :  TEMPORARY USED FOR SUMMING 1970 POPULATIONS.
C               STIN   :  TEMPORARY USED FOR SUMMING TOTAL INCOME.
```

```
C              SWTSUM :  TEMPORARY USED FOR SUMMING WEIGHTED SUMS FOR
C                        THE AVERAGE AGES.
C              S18T65 :  SUM OF THE 18 TO 65 AGE GROUPS
C              TERM   :  REAL VARIABLE USED TO COMPUTE THE WEIGHTED
C                        GROWTH RATE OF AN OCTANT IN THE CASE OF AN
C                        OCTANT WITH MULTIPLE POLYGONS
C              TFMPOP :  ARRAY FOR ACCUMULATING FAMILY POPULATIONS; ROWS
C                        ARE OCTANTS, COLUMNS ARE LDNS.
C              TINCOM :  TEMPORARY FOR SUMMING THE TOTAL INCOMES.
C              TMNPRO :  3-DIMENSIONAL ARRAY FOR ACCUMULATING THE
C                        OCCUPATIONS; ROW 1 IS MANAGER/PROF ONLY AND
C                        ROW 2 IS ALL CATEGORIES; COLS ARE OCTANTS
C                        PLANES ARE LDNS.
C              TPOP70 :  TEMPORARY FOR ACCUMULATING THE 1970 POPULATIONS
C                        ROWS ARE OCTANTS, COLUMNS ARE LDNS.
C              TV     :  TEMPORARY FOR ACCUMULATING TV DATA. ROWS ARE
C                        OCTANTS, COLUMNS ARE LDNS.
C              T10    :  TEMPORARY FOR SUMMING OCCUPATIONAL CATEGORIES.
C              T18T65 :  TEMPORARY FOR TOTALING THE AVERAGE AGE DATA.
C              T9     :  TEMPORARY FOR TOTALING THE EDUCATIONAL DATA.
C              WT     :  TEMPORARY FOR TOTALING THE WEIGHTED SUMS OF THE
C                        FAMILY INCOME.
C              WTSUM  :  GENERAL PURPOSE TEMPORARY FOR STORAGE OF
C                        WEIGHTED SUMS.
C              WTSUM1 :  SAME AS WTSUM.
C              WT1    :  TEMPORARY FOR SUMMING THE WTSUM1 WEIGHTED SUMS.
C              X      :  TEMPORARY VARIABLE USED IN LOGARITHMIC
C                        CALCULATIONS.
C
C
C      COMMON VARIABLES:
C              /COMM/
C                   SEE SUBROUTINE RDREPT COMMON BLOCK DESCRIPTION.
```

```
C                         SUBROUTINE HEADER
C
C
C     OBJECTIVE:
C              TO PRINT OCTANT REPORT HEADERS
C
C
C     PARAMETERS:
C              INPUT:
C                   KOCT    :  THE OCTANT NUMBER OF THE OCTANT BEING
C                              PRINTED. ( 1 - 8 )
C                   NAME    :  THE AIRPORT NAME FOR THE HEADING ( 80 R1 )
C                   KADRS   :  THE AIRPORT ADDRESS ( 80 R1 )
C              OUTPUT:
C                   ICASE   :  60-WORD ARRAY CONTAINING CASE NAME
C                   MINUS   :  INTEGER VARIABLE, NON-ZERO FOR LANDUSE
C                              INSULATION COUNTERMEASURES, THAT REPRE-
C                              SENTS THE DB DECREMENT FOR THE 65 LDN
C                              (AND GREATER) VALUE
C
C     CALLING ROUTINE:
C              AUREPT
C
C
C     SUBPROGRAMS USED:
C              GETCON : COMPASS SUBROUTINE THAT SAMPLES REGISTER VALUES
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              IOCT    :  3 LETTER MNEUMONIC FOR OCTANT AS FOLLOWS:
C                         1 = ESE    2 = SSE    3 = SSW    4 = WSW    5 = WNW
C                         6 = NNW    7 = NNE    8 = ENE
C              IR1     :  INTEGER VALUE OF REGISTER 1
C              IR2     :  INTEGER VALUE OF REGISTER 2
C              IR3     :  INTEGER VALUE OF REGISTER 3
C              K       :  GENERAL PURPOSE IMPLIED DO LOOP INDEX.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              INPUT:
C                   NONE
C              OUTPUT:
C                   TAPE6 - LINE PRINTER FILE WITH CARRIAGE CONTROL
```

```
C                         SUBROUTINE CHART
C
C
C     OBJECTIVE:
C             TO PRINT THE 16 DEMOGRAPHIC VARIABLES BY LDN BAND VALUES
C             IN REPORT FORM USING THE LINE PRINTER.
C
C     PARAMETERS:
C             INPUT:
C                  TABLE  :  THE 3-DIMENSIONAL TABLE STORING THE
C                            DEMOGRAPHIC VARIABLES TO BE PRINTED.
C                  LDNS   :  A VECTOR STORING THE LDN VALUES IN
C                            ASCENDING ORDER.
C                  N      :  THE OCTANT INDEX TO TABLE
C                  NCON   :  STARTING INDEX TO THE LDN TABLE.  IF NCON
C                            IS GREATER THAN ONE THEN 1 OR MORE LDN
C                            CONTOURS WERE MISSING.
C                  IYEAR  :  USER-DESIGNATED YEAR OF POPULATION UPDATE
C                  GR2    :  USER-DESIGNATED GROWTH RATE
C
C
C     CALLING ROUTINE:
C             AUREPT
C
C
C     SUBPROGRAMS USED:
C             BREAK  :  BREAK BREAKS OUT 5 COLUMNS OUT OF THE
C                       3-DIMENSIONAL TABLE TO A VECTOR CALLED LINE.
C             CHART1 :  ALTERNATIVE OCTANT PRINTING ROUTINE USED WHEN
C                       LDN CONTOURS ARE MISSING (NCON GT 1)
C
C
C     FUNCTIONS USED:
C             NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C             I      :  IMPLIED DO LOOP INDEX.
C             J      :  IMPLIED DO LOOP INDEX.
C             K      :  DO LOOP INDEX FOR REPLACING VERY SMALL AREA
C                       QUANTITIES WITH A "-".
C             LINE   :  GENERAL PURPOSE 5 WORD VECTOR USED TO ENCODE
C                       BAND VALUES FOR CONVENIENT PRINTING.
C
C     COMMON VARIABLES:
C             NONE
C
C     FILES USED:
C             OUTPUT:
C                  TAPE6  :  SEQUENTIAL LINE PRINTER FILE FOR OCTANT
C                            REPORT.
```

```
C
C                       SUBROUTINE CHART1
C
C
C     OBJECTIVE:
C             TO PRINT OCTANT REPORTS TO THE PRINTER AS AN ALTERNATIVE
C             TO SUBROUTINE CHART WHEN LDN CONTOUR ARE MISSING.
C
C
C     PARAMETERS:
C             INPUT:
C                  TABLE  :  3-DIMENSIONAL TABLE STORING THE
C                            DEMOGRAPHIC VARIABLES.
C                  LDNS   :  6 WORD VECTOR STORING THE RANGE OF LDN
C                            CONTOUR VALUES.
C                  N      :  THE OCTANT NUMBER TO BE PRINTED.
C                  NCON   :  THE STARTING INDEX IN THE TABLE OF LDNS
C                            WHICH COMPENSATES FOR MISSING CONTOURS.
C                  IYEAR  :  USER-DESIGNATED YEAR OF POPULATION UPDATES
C                  GR2    :  USER-DESIGNATED GROWTH RATE
C             OUTPUT:
C                  NONE
C
C
C     CALLING ROUTINE:
C             CHART
C
C
C     SUBPROGRAMS USED:
C             BREAK  :  BREAK BREAKS OUT 5 COLUMNS OUT OF THE
C                       3-DIMENSIONAL TABLE TO A VECTOR CALLED LINE.
C
C
C     FUNCTIONS USED:
C             NONE
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C              I      :  IMPLIED DO LOOP INDEX.
C              INDEX  :  ARRAY INDEX TO LDN TABLE USED TO COMPUTE
C                        MISSING CONTOUR VALUES AT LOW END OF CONTOUR
C                        RANGE.
C              INT    :  THE INTERVAL BETWEEN CONTOUR VALUES; EXPECTED
C                        VALUE IS 5.
C              J      :  IMPLIED DO LOOP INDEX.
C              JCON   :  THE NUMBER OF CONTOUR BANDS THAT WERE FOUND.
C              K      :  DO LOOP INDEX USED TO CHECK FOR SMALL AREAS.
C              KCON   :  THE NUMBER OF CONTOUR BANDS THAT WERE NOT FOUND
C              LINE   :  GENERAL PURPOSE 5 WORD VECTOR USED TO ENCODE
C                        BAND VALUES FOR CONVENIENT PRINTING.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              INPUT:
C                   NONE
C              OUTPUT:
C                   SEQUENTIAL LINE PRINTER FILE FOR OCTANT REPORT.
C              SCRATCH:
C                   NONE
C
C
```

```
C
C
C                           SUBROUTINE BREAK
C
C
C     OBJECTIVE:
C              BREAK CREATES A VECTOR FROM A SELECTED ROW OF THE
C              3-DIMENSIONAL TABLE.
C
C
C     PARAMETERS:
C              INPUT:
C                   TABLE  :  THE 3-DIMENSIONAL TABLE OF DEMOGRAPHIC
C                             VARIABLES.
C                   KROW   :  THE SELECTED ROW TO BE VECTORIZED.
C                   KPLANE :  THE SELECTED PLANE WHERE THE SELECTED ROW
C                             RESIDES.
C              OUTPUT:
C                   LINE   :  THE VECTOR REMOVED FROM THE 3-DIMENSIONAL
C                             TABLE.
C
C
C     CALLING ROUTINE:
C              CHART, CHART1
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              I      :  DO LOOP INDEX USED FOR COLUMNS OF TABLE.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              NONE
C
C
C
```

```
C
C                      SUBROUTINE SUMARY
C
C
C     OBJECTIVE:
C             SUMARY COMPUTES AND PRINTS A NOISE IMPACT SUMMARY REPORT
C             BASED ON THE POPULATION DATA AND THE LDN VALUES.
C
C
C     METHOD:
C             SIX VALUES ARE CALCULATED FOR EACH OCTANT AND A TOTAL
C             FOR EACH VALUE IS COMPUTED FOR ALL OCTANTS. THE VALUES
C             ARE NAMED AND COMPUTED AS FOLLOWS:
C
C             IMPACTED POPULATION      THE SUM OF THE 1981 POPULATIONS
C                                      FOR ALL BANDS OF AN OCTANT.
C             LEVEL WEIGHTED POP.      THE POPULATION EXPOSED TO A
C                                      CERTAIN LDN BAND IS WEIGHTED.
C                                      THE FOLLOWING FORMULA IS USED TO
C                                      COMPUTE THE WEIGHT CORRESPONDING
C                                      TO A GIVEN LDN VALUE:
C
C                                                .103LDN
C                                      .000124(10       )
C                                      -----------------------------
C                                           .03LDN          .08LDN
C                                      .2(10      )+.000143(10      )
C
C                                      THE LEVEL WEIGHTED POPULATION IS
C                                      THE SUM OF THE PRODUCTS OF THE
C                                      POPULATIONS AND THEIR WEIGHTS.
C             NOISE IMPACT INDEX       THE LEVEL WEIGHTED POPULATION
C                                      DIVIDED BY THE TOTAL POPULATION.
C             EQUIVALENT NOISE LEVEL   A TABLE OF WEIGHTS IS CALCULATED
C                                      FOR EACH LDN VALUE USING THE
C                                      FORMULA GIVEN ABOVE. THE LDN
C                                      VALUES ARE THE BAND AVERAGES; EG
C                                      65 - 70 HAS VALUE 67. THE ENL IS
C                                      OBTAINED BY INTERPOLATING THE
C                                      NII IN THE TABLE OF WEIGHTS.
C                                      ONCE A WEIGHT IS KNOWN A
C                                      CORRESPONDING LDN CAN BE
C                                      INTERPOLATED. THIS LDN IS THE
C                                      ENL.
C             PERCENT HIGHLY ANNOYED   THE PRODUCT OF THE NII AND THE
C                                      CONSTANT 36.9.
C             POP. HIGHLY ANNOYED      THE PRODUCT OF THE LWP AND THE
C                                      CONSTANT .369
C
```

```
C
C     PARAMETERS:
C              INPUT:
C                   ALINE  :  2-DIMENSIONAL ARRAY CONTAINING AREAS
C                             OF 65, 75, 85 DB CONTOURS.
C                   ICASE  :  60-WORD ARRAY CONTAINING CASE TITLE
C                   MINUS  :  INTEGER VALUE, NON-ZERO FOR LANDUSE
C                             INSULATION COUNTERMEASURES, REPRE-
C                             SENTING ,FOR THOSE CASES, THE DB
C                             DECREMENT FOR LDN VALUES GREATER
C                             THAN OR EQUAL TO 65 LDN
C                   TABLE  :  THE 3-DIMENSIONAL TABLE USED HERE TO
C                             SUPPLY THE POPULATION DATA.
C                   LDNS   :  8 WORD VECTOR CONTAINING THE CONTOUR LDN
C                             VALUES.
C                   LINE1  :  80 WORD ARRAY FOR STORAGE OF THE AIRPORT
C                             NAME IN 80 R1 FORMAT.
C                   LINE2  :  80 WORD ARRAY FOR STORAGE OF THE AIRPORT
C                             ADDRESS IN 80 R1 FORMAT.
C              OUTPUT:
C                   NONE
C
C
C     CALLING ROUTINE:
C              AUREPT
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              INTERP :  USED TO FIND A WEIGTING FACTOR GIVEN AN NII;
C                        THEN INTERPOLATES AN LDN FROM THE WEIGHT.
C              PERCNT :  USED TO CALCULATE THE WEIGHTS USING THE FORMULA
C                        DESCRIBED ABOVE.
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C              DBVAL  :  INTEGER VARIABLE USED TO REPRESENT CONTOUR
C                        VALUE WHEN PRINTING OUT AREA OF CONTOUR
C              ENL    :  A 9 WORD VECTOR USED TO STORE THE COMPUTED
C                        EQUIVALENT NOISE LEVEL FOR PRINTING BY OCTANT
C                        AND TOTAL OF ALL OCTANTS.
C              I      :  GENERAL PURPOSE DO LOOP INDEX.
C              IDASH  :  WORD USED TO STORE THE SYMBOL "-", TO
C                        BE USED AS SUBSTITUTE VALUE FOR NII,ENL,
C                        PCTHA, AND POPHA WHEN A CORRESPONDING
C                        BASELINE CASE POPULATION VALUE EQUALS ZERO
C                        (UTILIZED ONLY IN COUNTERMEASURE CASES).
C              IR1    :  VALUE OF REGISTER 1
C              IR2    :  VALUE OF REGISTER 2
C              IR3    :  VALUE OF REGISTER 3
C              J      :  DO LOOP INDEX FOR OCTANTS.
C              JJ     :  INDEX USED FOR DECODING NII, ENL, PCTHA,
C                        AND POPHA
C              K      :  INDIRECT DO LOOP INDEX BASED ON J TO REVERSE
C                        INDEX THE ARRAYS.
C              LDNTAB :  A 5 WORD VECTOR USED TO STORE THE LDN BAND
C                        AVERAGE VALUES; 67,72,77,82,85
C                        THE LAST VALUE IS FOR OVER 85 AREA.
C              LINE   :  9-WORD ARRAY USED IN PRINTING OF NII, ENL,
C                        PCTHA, AND POPHA
C              LWP    :  9 WORD VECTOR USED TO STORE THE COMPUTED LEVEL
C                        WEIGHTED POPULATIONS BY OCTANT AND TOTAL.
C              NII    :  9 WORD VECTOR USED TO STORE THE COMPUTED NOISE
C                        IMPACT INDEX BY OCTANT AND TOTAL.
C              PCTHA  :  9 WORD VECTOR USED TO STORE THE PERCENT HIGHLY
C                        ANNOYED BY OCTANT AND TOTAL.
C              POPHA  :  9 WORD VECTOR USED TO STORE THE POPULATION
C                        HIGHLY ANNOYED BY OCTANT AND TOTAL.
C              TOTPOP :  USED TO SUM THE RUNNING TOTAL BY OCTANTS.
C              WTS    :  A 5 WORD VECTOR USED TO STORE THE WEIGHTING
C                        FACTORS FOR THE LDN BANDS.
C              XLDN   :  USED FOR FLOATING PT. STORAGE OF THE INTEGER
C                        VALUES IN THE ARRAY LDNTAB.
C
C
C     COMMON VARIABLES:
C              NONE
C
C
C     FILES USED:
C              INPUT:
C                   NONE
C              OUTPUT:
C                   TAPE6  - SEQUENTIAL - LINE PRINTER FILE FOR SUMMARY
C                                         REPORT.
```

```
C
C                    FUNCTION INTERP
C
C
C     OBJECTIVE:
C             TO RETURN AN  EQUIVALENT NOISE LEVEL VALUE IN LDN FORM
C             GIVEN A NOISE IMPACT INDEX.
C
C
C     METHOD:
C             INTERP USES THE GIVEN NOISE IMPACT INDEX TO FIND AN ENTRY
C             IN THE WEIGHTS TABLE THAT IS GREATER THAN THE NOISE
C             IMPACT INDEX. THE WEIGHT TABLE STORES THE WEIGHTS IN
C             ASCENDING ORDER CORRESPONDING TO THE LDN BAND AVERAGE
C             VALUES. INTERP THEN COMPUTES THE PROPORTION OF THE NOISE
C             IMPACT INDEX BETWEEN THE WEIGHT ENTRIES IN THE TABLE.
C             THIS PROPORTION IS THEN USED TO COMPUTE THE APPROPRIATE
C             LDN WHICH IS PROPORTIONATELY LOCATED BETWEEN THE TWO
C             CORRESPONDING LDN ENTRIES IN THE LDN TABLE. IF THE NOISE
C             IMPACT INDEX IS LESS THAN THE FIRST ENTRY IN THE WEIGHT
C             TABLE, THE FLOOR VALUES FOR WEIGHTS AND LDNS ARE ZEROES.
C             IF NO ENTRY IN THE WEIGHTS TABLE IS GREATER THAN THE
C             NOISE IMPACT INDEX THEN INTERP RETURNS THE GREATEST LDN
C             VALUE IN THE LDN TABLE AS THE EQUIVALENT NOISE LEVEL.
C
C
C     PARAMETERS:
C             INPUT:
C                 LDNS   :  A 6 WORD VECTOR STORING THE CONTOUR LDN
C                           VALUES IN ASCENDING ORDER.
C                 WTS    :  A 6 WORD VECTOR OF WEIGHTING FACTORS
C                           CORRESPONDING TO THE ELEMENTS OF THE
C                           VECTOR LDNS.
C                 NII    :  THE GIVEN NOISE IMPACT INDEX FOR WHICH AN
C                           EQUIVALENT NOISE LEVEL IS TO BE RETURNED.
C             OUTPUT:
C                 NONE
C
C
C     CALLING ROUTINE:
C             SUMARY
C
C
C     SUBPROGRAMS USED:
C             NONE
C
C
C     FUNCTIONS USED:
C             FLOAT  :  INLINE FUNCTION FOR INTEGER TO REAL CONVERSION.
C
```

```
C
C     LOCAL VARIABLE DICTIONARY:
C              BOT     :  THE FLOOR VALUE OF THE TWO WEIGHTS VALUES THAT
C                         ENCLOSE THE NOISE IMPACT INDEX.
C              I       :  DO LOOP INDEX FOR WEIGHTS AND LDNS TABLES.
C              INTERP  :  THE FUNCTION VARIABLE USED TO RETURN THE ENL.
C              XBOT    :  THE FLOOR VALUE OF THE TWO LDN VALUES THAT
C                         ENCLOSE THE ENL.
C              XLDNS   :  THE CEILING VALUE OF THE TWO LDN VALUES THAT
C                         ENCLOSE THE ENL.
C
C
```

```
C
C
C                         SUBROUTINE LASTPAG
C
C
C     OBJECTIVE:
C             TO WRITE A SEPARATE REPORT CONSISTING OF THE
C             NOISE IMPACT SUMMARY REPORT
C
C
C     PARAMETERS:
C             NONE
C
C
C     CALLING ROUTINE:
C             AUREPT
C
C
C     SUBPROGRAMS USED:
C             NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C             IPAGE  :  INTEGER ARRAY USED TO READ IN AND WRITE OUT REPORT
C
C
```

```
C
C
C                          FUNCTION PERCNT
C
C
C     OBJECTIVE:
C              TO CALCULATE A WEIGHTING FACTOR GIVEN AN LDN VALUE.
C
C
C     METHOD:
C               PERCNT IMPLEMENTS THE FOLLOWING FORMULA WHICH IS THE
C               CURVE OF PERCENT OF POPULATION "HIGHLY ANNOYED" AS A
C               FUNCTION OF NOISE LEVEL IN LDN.  THE PERCENT HIGHLY
C               ANNOYED CURVE IS NORMALIZED TO UNITY AT 75LDN BY
C               DIVIDING THE PERCENT HIGHLY ANNOYED BY 36.9, THE
C               PERCENT OF POPULATION HIGHLY ANNOYED AT 75LDN.
C
C                                                .103LDN
C              PERCENT HIGHLY ANNOYED = .000124(10        )
C                                      ------------------------------
C                                           .03LDN             .08LDN
C                                      .2(10      )+.000143(10      )
C
C
C     PARAMETERS:
C              INPUT:
C                   LDN     :  THE LDN VALUE USED TO CALCULATE A WEIGHT.
C              OUTPUT:
C                   NONE
C
C
C     CALLING ROUTINE:
C              SUMARY
C
C
C     SUBPROGRAMS USED:
C              NONE
C
C
C     FUNCTIONS USED:
C              NONE
C
C
C     LOCAL VARIABLE DICTIONARY:
C              E1      :  TEMPORARY FOR VALUE OF .103*LDN
C              E2      :  TEMPORARY FOR VALUE OF .03*LDN
C              E3      :  TEMPORARY FOR VALUE OF .08*LDN
C              PERCNT  :  THE FUNCTION VARIABLE USED TO RETURN THE
C                         COMPUTED WEIGHT.
```

NOTES AND COMMENTS

APPENDIX B

SITE II DATA BASE INSTALLATION

Four tapes were delivered by CACI, Inc. containing the 1981 SITE II database. These tapes contain data reflecting the 1970 census with 1980 to 1981 updates. The population data was contained on tapes NASA13, NASA14 and NASA15. The zip code data was contained on tape NASA00. NASA13 contained 15 PRU's or blocks of data each block 4424 characters in length, NASA14 and NASA15 contained 18 blocks each 4424 characters in length. The setup programs SETUP15 and SETUP18 were used to read the tape files according to the above mentioned specifications and write an intermediate file TAPE7 to be processed by the conversion program CONMN. The data from these tapes were converted from IBM character format to CDC CYBER binary data and written to the NOS labelled tapes ND0775 and ND1062.

Figures 16, 17 and 18 contain the job stream of control statements used to convert the IBM formatted population data and generate the NOS tapes. Figures 19, 20 and 21 illustrate the source for SETUP15, SETUP18 and CONMN, respectively. Figure 22 illustrates the job stream used to read the tape NASA00, convert the data using program CONZP and generate the new labelled tape ND1226. Figure 23 contains the source code for program CONZP.

```
CONMN,T300,CM60000.
USER.
CHARGE.
FTN,I=SETUP15.
FILE(TAPE5,RT=F,BT=K,FL=4424,MBL=4424,RB=1)
VSN,TAPE5=NASA13.
REQUEST,TAPE5,F=S,NT,D=1600,CV=EB,PO=R,LB=KU.NONLRC=NASA13
LDSET,FILES=TAPE5.
LGO.
RETURN,TAPE5.
REWIND,TAPE7,LGO.
GET,CONMN.
FTN,I=CONMN.
LOAD(LGO)
NOGO(CONMS)
VSN,TAPE1=ND0775.
LABEL,TAPE1,FI=AL,SI=MN1,QN=1,W,PO=W.
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
LABEL,TAPE1,FI=AK,SI=MN1,QN=9999.
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
       o
       o
       o
LABEL,TAPE1,FI=IN,SI=MN1,QN=9999.
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
```

Figure 16.-Step 1 job for the SITE II database conversion.

```
CONM2,T300,CM60000.
USER.
CHARGE.
GET,SETUP18.
FTN,I=SETUP18.
FILE(TAPE5,RT=F,BT=K,FL=4424,MBL=4424,RB=1)
VSN,TAPE5=NASA14.
REQUEST(TAPE5,F=S,NT,D=1600,LB=KU,CV=EB,PO=R)NONLRC=NASA14
LDSET(FILES=TAPE5)
LGO.
RETURN,TAPE5.
REWIND,TAPE7,LGO.
GET,CONMN.
FTN,I=CONMN.
LOAD(LGO)
NOGO(CONMS)
VSN(TAPE1=ND0775)
LABEL(TAPE1,FI=IA,SI=MN1,QN=9999,PO=W)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
LABEL(TAPE1,FI=KS,SI=MN1,QN=9999)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
        o
        o
LABEL(TAPE1,FI=MS,SI=MN1,QN=9999)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
RETURN,TAPE1.
VSN,TAPE1=ND1062.
LABEL(TAPE1,FI=MO,SI=MN2,QN=1,W,PO=W)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
        o
        o
LABEL(TAPE1,FI=NY,SI=MN2,QN=9999)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
```

Figure 17.-Step 2 job for the SITE II database conversion.

```
CONM3,T300,CM60000.
USER.
CHARGE.
GET,SETUP18.
FILE(TAPE5,RT=F,BT=K,FL=4424,MBL=4424,RB=1)
VSN(TAPE5=NASA15)
REQUEST(TAPE5,F=S,NT,D=1600,LB=KU,CV=EB,PO=R)NONLRC=NASA15
LDSET(FILES=TAPE5)
LGO.
RETURN,TAPE5.
REWIND,TAPE7,LGO.
GET,CONMN.
FTN,I=CONMN.
LOAD(LGO)
NOGO(CONMS)
VSN,TAPE1=ND1062.
LABEL(TAPE1,FI=NC,SI=MN2,QN=9999)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
LABEL(TAPE1,FI=ND,SI=MN2,QN=9999)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
       o
       o
LABEL(TAPE1,FI=WY,SI=MN2,QN=9999)
CONMS.
REWIND,TAPE8.
COPYBF,TAPE8,TAPE1.
RETURN,TAPE8.
```

Figure 18.-Step 3 job for the SITE II database conversion.

```
      PROGRAM SETUP15(OUTPUT,TAPE5=/4424,TAPE7=/4424)
      DIMENSION IN(443)
      IREC=1
      INREC=0
      IFICT=1
      INP=0
      IOT=0
 5    READ(5,100) IN
      IF(EOF(5))11,7
 7    INP=INP+1
      WRITE(7,100) IN
      IOT=IOT+1
      IF(INP.GE.2) INREC=INREC+6
      GO TO 5
11    ENDFILE 7
      IF(IFICT.EQ.15)GO TO 10
      PRINT 130,IREC,IOT,INREC,INP
      IREC=1
      INREC=0
      IFICT=IFICT+1
      INP=0
      GO TO 5
10    PRINT 120,IOT
      STOP
100   FORMAT(150A10,150A10,142A10,A4)
120   FORMAT(33H1NORMAL END OF PROCESSING, COUNT=,I5)
110   FORMAT(8X,9X,I9)
130   FORMAT(25H0ENDFILE WRITTEN. COUNTS=,4I5)
      END
```

Figure 19.-Setup program for 15 records.

```
      PROGRAM SETUP18(OUTPUT,TAPE5=/4424,TAPE7=/4424)
      DIMENSION IN(443)
      IREC=1
      INREC=0
      IFICT=1
      INP=0
      IOT=0
 5    READ(5,100) IN
      IF(EOF(5))11,7
 7    INP=INP+1
      WRITE(7,100) IN
      IOT=IOT+1
      IF(INP.GE.2) INREC=INREC+6
      GO TO 5
11    ENDFILE 7
      IF(IFICT.EQ.18)GO TO 10
      PRINT 130,IREC,IOT,INREC,INP
      IREC=1
      INREC=0
      IFICT=IFICT+1
      INP=0
      GO TO 5
10    PRINT 120,IOT
      STOP
100   FORMAT(150A10,150A10,142A10,A4)
120   FORMAT(33H1NORMAL END OF PROCESSING, COUNT=,I5)
110   FORMAT(8X,9X,I9)
130   FORMAT(25H0ENDFILE WRITTEN. COUNTS=,4I5)
      END
```

Figure 20.-Setup program to process 18 records.

```
      PROGRAM CONMN(OUTPUT,TAPE6=OUTPUT,TAPE7=/4424,TAPE8)
C
C     PROGRAM TO CONVERT MAIN DATABASE FROM CHAR TO BINARY NASA/LRC.
C     DATABASE CREATED ON IBM 370 WITH FORMAT
C        BLKSIZE=4424,LRECL=4424,DEN=3, STANDARD EBCDIC
C     PARAMS
C          INPUT REC =        736 CHARACTERS
C          INPUT BLOCK =      4416 CHARACTERS
C          INPUT BLOCK FACTOR = 6
C          OUTPUT REC =       89 BINARY WORDS 3 DBL PRECISION=92E
C          OUTPUT BLOCK =     534 BINARY WORDS 3 DBL PRECISION=552E
C          OUTPUT BLOCK FACTOR = 6
C
      DIMENSION INDEX(800),II(552),FOREC1(92,6),FOREC2(46,6)
      COMMON IOREC1(92,6)
      DOUBLE PRECISION FOREC2
      EQUIVALENCE(II(1),IOREC1(1,1))
      EQUIVALENCE(IOREC1(1,1),FOREC1(1,1))
      EQUIVALENCE(IOREC1(1,1),FOREC2(1,1))
      IREC=1
      INREC=0
      IFILE=7
      INP=0
      IOT=1
      CALL OPENMS(8,INDEX,800,0)
    5 READ(IFILE,100)((IOREC1(I,J),I=1,2),(FOREC1(I,J),I=3,4),
     1(FOREC2(I,J),I=3,5),(IOREC1(I,J),I=11,92),J=1,6)
      IF(EOF(IFILE)) 10,7
    7 INP=INP+1
      IF(INP.GE.2) IREC=IOREC1(2,1)
      CALL WRITMS(8,II,552,IOT)
      IOT=IOT+1
      IF(INP.GE.2) INREC=INREC+6
      GO TO 5
   11 IOT=IOT-1
      PRINT 120,INP,IOT,INREC,IREC
      CALL CLOSMS(8)
      STOP
   10 PRINT 110,INP
      STOP
  100 FORMAT(8X,6(2I9,2F7.4,3F16.0,82I8))
  110 FORMAT(33H0NORMAL END OF PROCESSING, COUNT=,I5)
  120 FORMAT(140FILE WRITTEN.,12HINPUT BLOCKS,I5,13HOUTPUT BLOCKS,
     1,I5,13HINPUT RECORDS,I5,7HCOUNTER,I5)
      END
```

Figure 21.-Database conversion program.

```
CONZIP,T300,CM60000.
USER.
CHARGE.
GET,CONZP.
FTN,I=CONZP.
FILE(TAPE7,RT=F,BT=K,FL=3208,MBL=3208,RB=1)
VSN,TAPE7=NASA00.
REQUEST(TAPE7,F=S,NT,D=1600,LB=KU,CV=EB,PO=R)
LDSET(FILES=TAPE7)
LGO.
RETURN,TAPE7.
VSN,TAPE2=ND1226.
LABEL(TAPE2,SI=ZIPCDS,FI=ZIPALL,QN=1,W,PO=W)
COPYBF,TAPE8,TAPE2.
RETURN,TAPE2.
```

Figure 22.-Job to process the zip code portion of SITE II.

```
      PROGRAM CONZP(OUTPUT,TAPE6=OUTPUT,TAPE7=/3208,TAPE8)
C
C     PROGRAM TO CONVERT ZIP DATABASE FROM CHARACTER TO
C        BINARY FOR NASA/LRC.
C     DATABASE CREATED ON IBM 370 WITH FORMAT:
C     LRECL=3204,BLKSIZE=3208,RECFM=VS,DEN=3
C     PARAMS:
C         INPUT RECORD = 32 CHARACTERS
C         INPUT BLOCK = 3200 CHARACTERS
C         OUTPUT BLOCK FACTOR = 100
C         OUTPUT RECORD = 5 BINARY WORDS
C         OUTPUT BLOCK = 500 BINARY WORDS
C         OUTPUT BLOCK FACTOR = 100
C
      DIMENSION INDEX(4000),II(500)
      DIMENSION IOREC(5,100),FOREC(5,100)
      EQUIVALENCE(II(1),IOREC(1,1))
      EQUIVALENCE(IOREC(1,1),FOREC(1,1))
      IOT=1
      INP=0
      CALL OPENMS(8,INDEX,4000,0)
    5 READ(7,100)((IOREC(I,J),I=1,3),FOREC(4,J),IOREC(5,J),J=1,100)
      IF(EOF(7)) 10,7
    7 INP=INP+1
      CALL WRITMS(8,II,500,IOT)
      IOT=IOT+1
      GO TO 5
   10 PRINT 110,INP
      STOP
  100 FORMAT(8X,100(I5,2I9,F5.4,I4))
  110 FORMAT(33HNORMAL END OF PROCESSING, COUNT=,I5)
      END
```

Figure 23.-Conversion program to process zip code data.

7.0 REFERENCES

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16. Abstract

The purpose of this document is to describe the Airport-noise Levels and Annoyance Model (ALAMO) in terms of a detailed description of the constituent modules, to describe the execution of ALAMO procedure files, necessary for system execution, and to present the source code documentation associated with code development at Langley Research Center. The modules constituting ALAMO are presented both in flow graph form, and through a description of the subroutines and functions that comprise them.

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