Telecommunications Link

Traffic Systems Management Center and
University of Washington

WA-RD 63.1

Final Report
June 1984

Washington State Department of Transportation
Planning, Research and Public Transportation Division
In Cooperation with
United States Department of Transportation
Federal Highway Administration

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16. Abstract

This report describes a newly established telecommunications link between Seattle's Traffic System Management Center (TSMC) and the University of Washington's (UW) Information Retrieval System. Volume data in five-minute intervals collected by the TSMC is transferred to the UW computer system. The reports contains a description of this link and a User's Guide for those who wish to access the data.

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TELECOMMUNICATIONS LINK:

TRAFFIC SYSTEMS MANAGEMENT CENTER AND UNIVERSITY OF WASHINGTON

BY N. L. NIHAN

Washington State Transportation Center
(TRAC)
University of Washington

FINAL REPORT

Research Project Y-2811

Prepared for
Washington State Highway Commission
Department of Transportation
and in cooperation with
U.S. Department of Transportation
Federal Highway Administration

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ABSTRACT

This report describes a newly established telecommunications link between Seattle's Traffic System Management Center (TSMC) and the University of Washington's (UW) Information Retrieval System. Volume and lane occupancy are collected by the TSMC in 20-second intervals as part of its Ramp Metering System (an element of the set of WSDOT traffic management techniques known as the FLOW system). The collected data are aggregated into five-minute intervals and transferred to the UW computer system via the telecom link.

This report contains a description of the link and a User's Guide for those who wish to access the data currently stored on magnetic tape at the University Academic Computer Center (ACC).

EXECUTIVE SUMMARY

The summary of the draft final report entitled "Telecommunications Link: Traffic Systems Management Center and the University of Washington" covers activities for the nineteen months ending February 28, 1985. These activities were performed under a Washington State Department of Transportation contract for Research Project Y-2811 with the University of Washington. The University research has been executed by the Department of Civil Engineering under the direction of Dr. Nancy L. Nihan.

The major result of this project has been the installation of a telecommunications link between the Traffic Systems Management Center (TSMC) and the University of Washington. The link allows transfer of five-minute volume and lane occupancy data from the TSMC to the University's Cyber computer. An interface program adapts the data to Cyber - compatible format and stores it on magnetic tape. Selected data sets can then be retrieved and manipulated through another interface program to form input for most of the UW's analysis software.

At this time, a tape library of volume data from June 11, 1981 to the present is accessible through the University computer. Lane occupancy data is just beginning to be transferred since disk expansion at the TSMC and program modifications were required before occupancy data could be sent. These are now in place. A User's Guide for retrieval and analysis of the volume and occupancy data has been compiled and is included in the report Appendix.

Recommendations

Since the collected freeway data are stored in five-minute interval

values, the amount of data to be searched for particular retrieval purposes is substantial. Thus, the costs of data retrieval and manipulation are fairly high for certain types of summaries and analyses. Major modifications to the interface programs that currently exist could cut these costs significantly, but would require further research and programming effort. Additional research into the types of new interface programs that could be added to make the system even more user-friendly is also desirable.

Data summaries such as monthly ADT or AWDT at selected stations, peak-hour summaries, etc. can be obtained with further programming effort. Investigation of the types of summary statistics required by future WSDOT research projects and other users is another desirable extension of the Telecom project. Once user needs are identified, software can be developed to supply the summary statistics most likely to be required on a regular basis.

CONCLUSIONS AND RECOMMENDATIONS

Currently, the Freeway Information System (FIS) at the University of Washington can receive volume and lane occupancy data from the TSMC and store these data on magnetic tape. Selected data sets can then be retrieved from the tape via the data base management routine UWRIM and manipulated to form input files for almost all of the University's software library. In short, there exists a well-established information flow bewteen TSMC's volume and occupancy data and the University's application software.

The collected data are stored in five-minute interval values for each loop in the FLOW system. Since there are currently 1700 loops in the system, this involves transfer of 489,000 values of volume data for each 24 hour period and an equal number of lane occupancy values each day. Thus the amount of data to be searched can be substantial, particularly if the desired data set is a time-series over several months of data for non-adjacent stations.* Although the current interface programs that read the tapes and manipulate the data are adequate and relatively user-friendly, further programming effort could significantly reduce costs of retrieval and improve ease of access by other users. Program modifications to make the FREELD program more efficient and new interface programs to increase the ease of user interaction are desirable.

Future WSDOT research projects may require certain basic data summaries for particular stations. These might include statistics such as ADT, AWDT, peak hour volumes and occupancy rates, etc. Development of

*Stations are sets of loop detectors at a particular location.

software that could develop such statistics while each day's data is being transferred would provide an efficient means of maintaining a running tally for perhaps 30-50 selected stations. By doing the calculations on disk prior to tape storage, the CPU time involved would be significantly less than that required to read a month's worth of data from a tape and then summarize it. Further research is needed to determine the best representative stations and the summary statistics most useful to future system users and future WSDOT research projects. Once user needs are identified, it is recommended that the software be developed to provide these statistics for regular intervals.

PROCEDURES

Development of the telecommunication link between the TSMC and the UW involved purchase of a single line synchronous adapter installed in the TSMC's Perkin-Elmer minicomputer. In order to transfer a full day's lane occupancy data as well as the volume data, disk expansion of the TSMC computer was also required. In addition, software was developed at both the TSMC and UW ends to allow the data to be transferred and stored in formats compatible with both computers and the dedicated line. The dedicated line, 4800 baud modems at each end, and a "smart" 1200 baud modem at the TSMC end were all rented on a monthly basis.

A program was written at the TSMC to automatically log in on the UW Cyber and transfer the volume data each night. This automatic transfer was being done prior to August,1984, when the operating system on the Cyber was changed. The new operating system has a hidden (so far) feature that aborts the program that allows automatic transfer. Although the necessary program modification has not yet been determined, the TSMC is working on it. Meanwhile, the volume data can be transferred interactively over the line. After the disk expansion was completed, the program was modified so that the occupancy data which is in a different format could also be transferred interactively. This is now in place, although an occupancy library has not yet been started. Thus, both volume and lane-occupancy data can currently be transferred interactively over the line. Once the program bug is corrected at the TSMC end, both data sets may be automatically transferred each night.

DISCUSSION

The current status of the telecommunications link between the TSMC and the University of Washington CDC computer is illustrated in Figure 1. Data are collected at data stations along the freeway system at one-second intervals. Each data station consists of a number of traffic loops associated with freeway lanes and ramps. The volume and occupancy data that are collected in one-second intervals are aggregated by the TSMC computer into five-minute data. These data can then be transmitted over telephone lines to the University of Washington CDC computer and stored on magnetic tape. The data can then be retrieved from tape by use of an interface program called FREELD developed by Thomas A. Ashbrook. Once retrieved, the data is then manipulated using a data management program called UWRIM. The manipulated data is then in the form required for use in applications programs such as SPSS, MINITAB, SIMPLOT, etc.

An example of the retrieval and analysis process is given below. Figure 2 shows four example stations for which data might be provided. Figure 3 gives the sample list of freeway detector stations that are in the vicinity of the stations of interest. Assume we are interested in volume data for northbound stations Denny, Mercer, Galer and Newton (i.e., stations 24, 26, 28 and 30). Figure 4 illustrates the first step in retrieving the necessary data. The correct tape is selected and read by invoking the FREELD program. In this example, we are reading 24-hours worth of data for a single day, May 10, 1982. Data for stations 23 through 30 are read since we may want to look at the southbound stations later and also since it is more cost-effective to read consecutive stations. The FREELD program then manipulates the data so

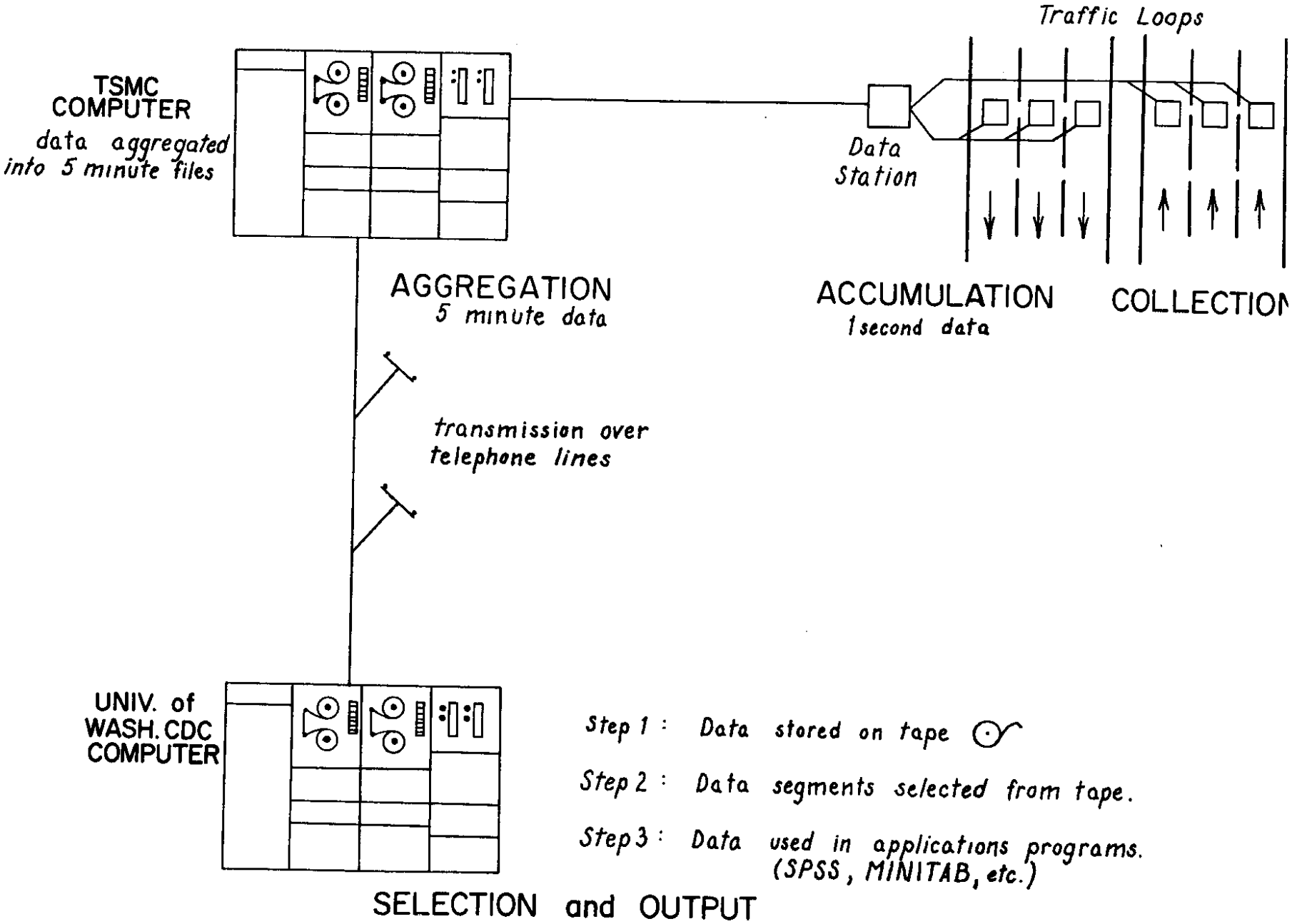

Traffic Loops
TSMC
COMPUTER
data aggregated
into 5 minute files
Data
Station
AGGREGATION
5 minute data
ACCUMULATION
1 second data
COLLECTION
transmission over
telephone lines
UNIV. of
WASH. CDC
COMPUTER
Step 1 : Data stored on tape
Step 2 : Data segments selected from tape.
Step 3 : Data used in applications programs.
(SPSS, MINITAB, etc.)
SELECTION and OUTPUT

Figure 1

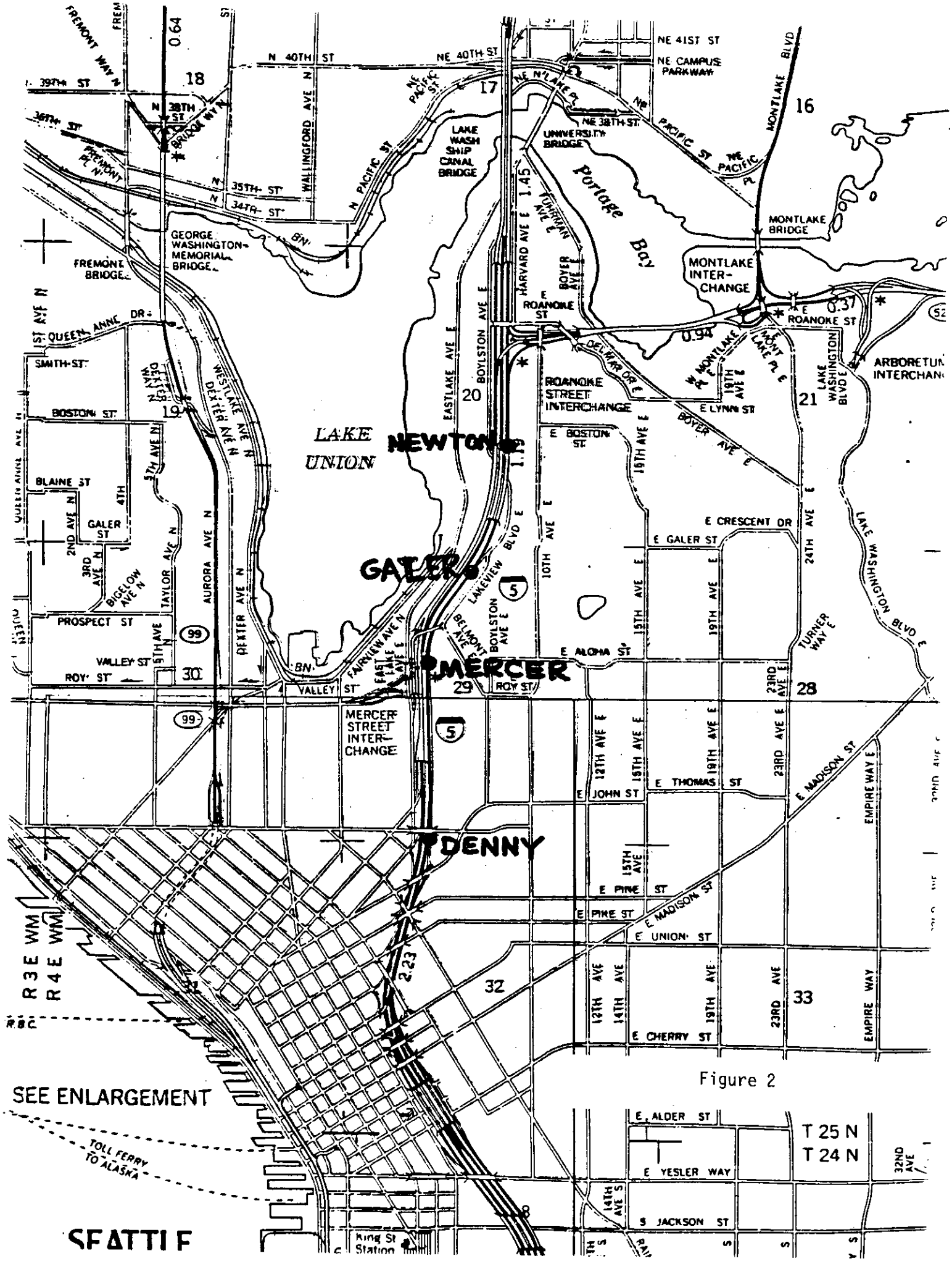

FREMONT WAY N
N 40TH ST
NE 40TH ST
NE 41ST ST
NE CAMPUS PARKWAY
MONTLAKE BLVD
N 39TH ST
N 38TH ST
BRIDGE WY N
36TH ST
FREMONT PL N
N 35TH ST
N 34TH ST
WALLINGFORD AVE N
N PACIFIC ST
NE PACIFIC ST
NE N'LAKE PL
LAKE WASH SHIP CANAL BRIDGE
UNIVERSITY BRIDGE
NE 38TH ST
NE PACIFIC PL
MONTLAKE BRIDGE
GEORGE WASHINGTON MEMORIAL BRIDGE
FREMONT BRIDGE
BN
HARVARD AVE E
FUHRMAN AVE E
BOYER AVE E
Portage Bay
MONTLAKE INTER-CHANGE
E ROANOKE ST
1ST AVE N
QUEEN ANNE DR
SMITH ST
BOSTON ST
QUEEN ANNE AVE N
DEXTER AVE N
WESTLAKE AVE N
EASTLAKE AVE E
BOYLSTON AVE E
ROANOKE STREET INTERCHANGE
DELMAR DR E
MONTLAKE BLVD E
MONT LAKE PL E
19TH AVE E
E LYNN ST
LAKE WASHINGTON BLVD E
ARBORETUM INTERCHANGE
LAKE UNION
NEWTON
BLAINE ST
GALER ST
2ND AVE N
3RD AVE N
4TH AVE N
5TH AVE N
BIGELOW AVE N
TAYLOR AVE N
AURORA AVE N
LAKEVIEW BLVD E
E BOSTON ST
16TH AVE E
E CRESCENT DR
E GALER ST
24TH AVE E
LAKE WASHINGTON BLVD E
PROSPECT ST
VALLEY ST
ROY ST
FAIRVIEW AVE N
EAST LAKE AVE E
BELMONT AVE E
MERCER
E ALOHA ST
TURNER WAY E
MERCER STREET INTER-CHANGE
10TH AVE E
15TH AVE E
19TH AVE E
23RD AVE E
E JOHN ST
E THOMAS ST
E MADISON ST
EMPIRE WAY E
DENNY
12TH AVE E
E PINE ST
E UNION ST
14TH AVE
19TH AVE
23RD AVE
E CHERRY ST
EMPIRE WAY
R3E WM
R4E WM
SEE ENLARGEMENT
TOLL FERRY TO ALASKA
SEATTLE
King St Station
E ALDER ST
E YESLER WAY
S JACKSON ST
14TH AVE S
32ND AVE
T 25 N
T 24 N
0.64
1.45
0.37
0.94
2.23
18
17
16
20
21
19
30
29
28
32
33
99
5

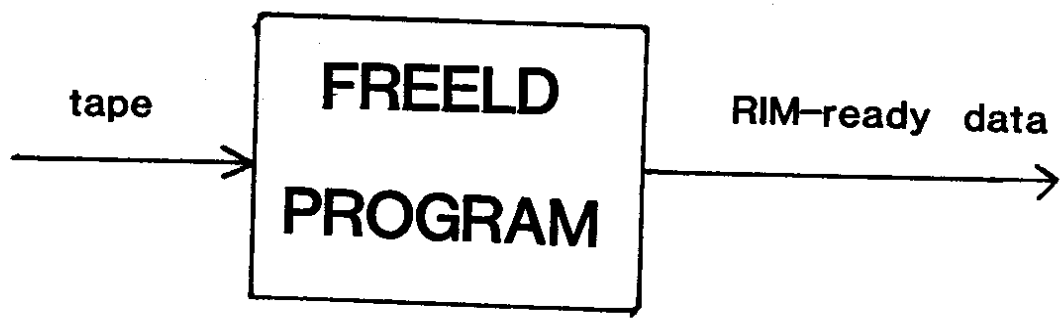
Figure 2

SAMPLE LIST OF FREEWAY DETECTOR STATIONS

STATIONS	ROUTE	PLACE	MILE	TY	QUEST
20	SR 5	SENECA	165.4900	NB	FC 5
21	SR 5	8TH AVE	165.8000	SB	ES 7
22	SR 5	8TH AVE	165.8000	NB	ES 7
23	SR 5	DENNY	166.3400	SB	ES 8
24	SR 5	DENNY	166.3400	NB	ES 8
25	SR 5	MERCER	167.0000	SB	ES 9
26	SR 5	MERCER	167.0000	NB	ES 9
27	SR 5	GALER	167.3500	SB	ES 9.6
28	SR 5	GALER	167.3500	NB	ES 9.6
29	SR 5	NEWTON	167.6400	SB	ES10
30	SR 5	NEWTON	167.6400	NB	ES10
31	SR 5	ROANOKE	168.1000	SB	FC11
32	SR 5	ROANOKE	168.1000	NB	FC11
33	SR 5	HAMLIN	168.3300	SB	ES10.2
34	SR 5	HAMLIN	168.3300	NB	ES10.2
35	SR 5	SHIP CANAL	168.8400	SB	SIGNCB
36	SR 5	SHIP CANAL	168.8400	NB	SIGNCB
37	SR 5	NE 42ND	169.1800	NB	ES10.4
38	SR 5	RAVENNA	170.2300	SB	ES12
39	SR 5	RAVENNA	170.2300	NB	ES12

Figure 3

SELECT DATA



EXAMPLE: Read 24-hours worth of data

from stations 23 through 30 for May 10, 1982

Figure 4

that it is in a form that is ready for UWRIM. Figure 5 shows the form of the data that is stored after being read by the FREELD program. Each station and loop number has a single value printed. For example, on May 10th at 4:00 p.m., station 23 (southbound) had a five-minute vehicle volume of 71 vehicles passing loop 68. At the same time, station 23 had a five-minute vehicle volume of 115 vehicles passing loop 69. Each station has four loop numbers associated with it corresponding to four freeway lanes northbound or southbound.

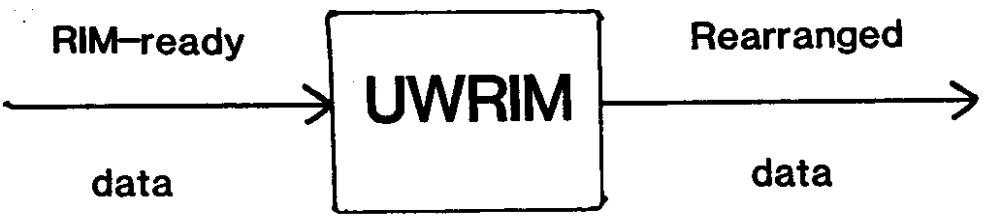
The next step is to manipulate the data so that the four loop values for each station can be read in a single row and to select only the northbound stations which are of interest for this example. Figure 6 illustrates this process. The data illustrated in Figure 5 are input to the UWRIM data management software. RIM is used to rearrange the data so that the data for any station are arranged in columns corresponding to each loop where a column of data for any loop represents its five-minute volumes over the 24-hour period. Figure 7 shows the data format resulting for station 30 from 3:00 p.m.to 6:00 p.m. Once the data is in the form shown in Figure 7, it is ready for input into any of the many choices of application software available at the UW. Figure 8 summarizes the example MINITAB session that is included in the Appendix. MINITAB is used to aggregate the data into station totals for each five-minute interval, daily totals, fifteen-minute totals, and sixty-minute totals. The plot command is used to get a fifteen minute plot. The MAX command is used to identify the morning peak five-minute volume, v, and a series of commands using lagged variables is used to get the morning peak-hour volume (the highest volume for any sixty-minute interval, regardless of starting time). These are then used to calculate the morning peak-hour factor which is a

FORM OF DATA STORED IN FREEDAT RELATION AFTER BEING READ BY THE FREELD PROGRAM

DATE	TIME	STATIONS	LOOPNUM	LOOPVAL
82/05/10	1600	23	68	71
82/05/10	1600	23	69	115
82/05/10	1600	23	70	117
82/05/10	1600	23	71	125
82/05/10	1600	24	72	78
82/05/10	1600	24	73	124
82/05/10	1600	24	74	137
82/05/10	1600	24	75	165
82/05/10	1600	25	76	0
82/05/10	1600	25	77	1
82/05/10	1600	25	78	2
82/05/10	1600	25	79	28
82/05/10	1600	26	80	129
82/05/10	1600	26	81	151
82/05/10	1600	26	82	137
82/05/10	1600	26	83	115
82/05/10	1600	27	84	58
82/05/10	1600	27	85	0
82/05/10	1600	27	86	4
82/05/10	1600	27	87	0
82/05/10	1600	27	88	127
82/05/10	1600	28	89	124
82/05/10	1600	28	90	163
82/05/10	1600	28	91	160
82/05/10	1600	28	92	166
82/05/10	1600	29	93	39
82/05/10	1600	29	94	0
82/05/10	1600	29	95	0
82/05/10	1600	29	96	8
82/05/10	1600	29	97	0
82/05/10	1600	30	98	105
82/05/10	1600	30	99	147
82/05/10	1600	30	100	153
82/05/10	1600	30	101	171
82/05/10	1605	23	68	71
82/05/10	1605	23	69	111
82/05/10	1605	23	70	139
82/05/10	1605	23	71	145
82/05/10	1605	24	72	59
82/05/10	1605	24	73	130
82/05/10	1605	24	74	143

Figure 5

REARRANGE DATA



EXAMPLE: Use only NB stations (24, 26, 28, 30).

Arrange in column form.

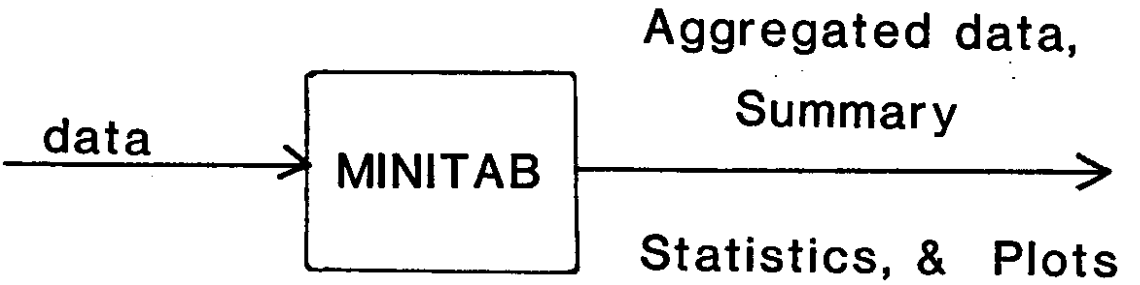
Figure 6

DATA FORMAT AFTER USING UWRIM

DATE	TIME	STATIONS	LOOPCT1	LOOPCT2	LOOPCT3	LOOPCT4
82/05/10	1500	30	101	148	117	106
82/05/10	1505	30	100	164	117	102
82/05/10	1510	30	110	135	101	112
82/05/10	1515	30	110	171	135	113
82/05/10	1520	30	96	174	129	105
82/05/10	1525	30	113	158	135	131
82/05/10	1530	30	99	138	115	119
82/05/10	1535	30	100	168	139	141
82/05/10	1540	30	151	180	173	180
82/05/10	1545	30	148	169	158	195
82/05/10	1550	30	129	166	152	173
82/05/10	1555	30	121	166	155	184
82/05/10	1600	30	105	147	153	171
82/05/10	1605	30	123	157	157	175
82/05/10	1610	30	131	163	156	181
82/05/10	1615	30	112	155	157	181
82/05/10	1620	30	118	170	169	183
82/05/10	1625	30	116	166	157	184
82/05/10	1630	30	117	168	150	176
82/05/10	1635	30	102	171	157	193
82/05/10	1640	30	124	176	165	189
82/05/10	1645	30	124	162	159	185
82/05/10	1650	30	121	183	155	186
82/05/10	1655	30	120	174	164	181
82/05/10	1700	30	93	162	147	179
82/05/10	1705	30	102	151	140	161
82/05/10	1710	30	123	176	170	199
82/05/10	1715	30	114	169	167	195
82/05/10	1720	30	110	179	173	188
82/05/10	1725	30	110	181	171	183
82/05/10	1730	30	129	185	161	161
82/05/10	1735	30	107	171	158	180
82/05/10	1740	30	97	175	159	168
82/05/10	1745	30	95	164	125	130
82/05/10	1750	30	82	135	119	128
82/05/10	1755	30	85	134	130	144
82/05/10	1800	30	92	148	128	144

Figure 7

APPLICATION EXAMPLE: MINITAB



EXAMPLE MINITAB SESSION: STATION 30

a) Station total for each 5 minute interval

b) Daily total (D)

c) 15-minute totals

d) 15-minute plot

e) 60-minute totals

f) Morning peak 5-minutes (v)

g) Morning peak hour (V)

h) Morning p.h.f. = V/(12 x v)

i) Afternoon p.h.f.

j) Morning peak hour percent V/D x 100

k) Afternoon peak hour percent

Figure 8

	STATION			
	24 (Denny)	26 (Mercer)	28 (Galer)	30 (Newton)
Daily Traffic	69,238	71,014	85,755	82,146
Morning Peak 5-minutes	480	459	526	488
Morning Peak hour	5,387	4,805	5,587	5,260
Morning phf	.935	.872	.885	.898
Morning Peak %	7.8	6.8	6.5	6.4
Afternoon Peak 5-minutes	600	619	718	684
Afternoon Peak hour	6,266	6,546	7,925	7,600
Afternoon phf	.870	.881	.920	.962
Afternoon peak %	9.0	9.2	9.2	9.3

Summary Statistics for Four Stations

Figure 9

SIMPLE MINITAB PLOT OF HOURLY TRAFFIC COUNTS VERSUS TIME FOR STATION 30, MAY 10, 1982.

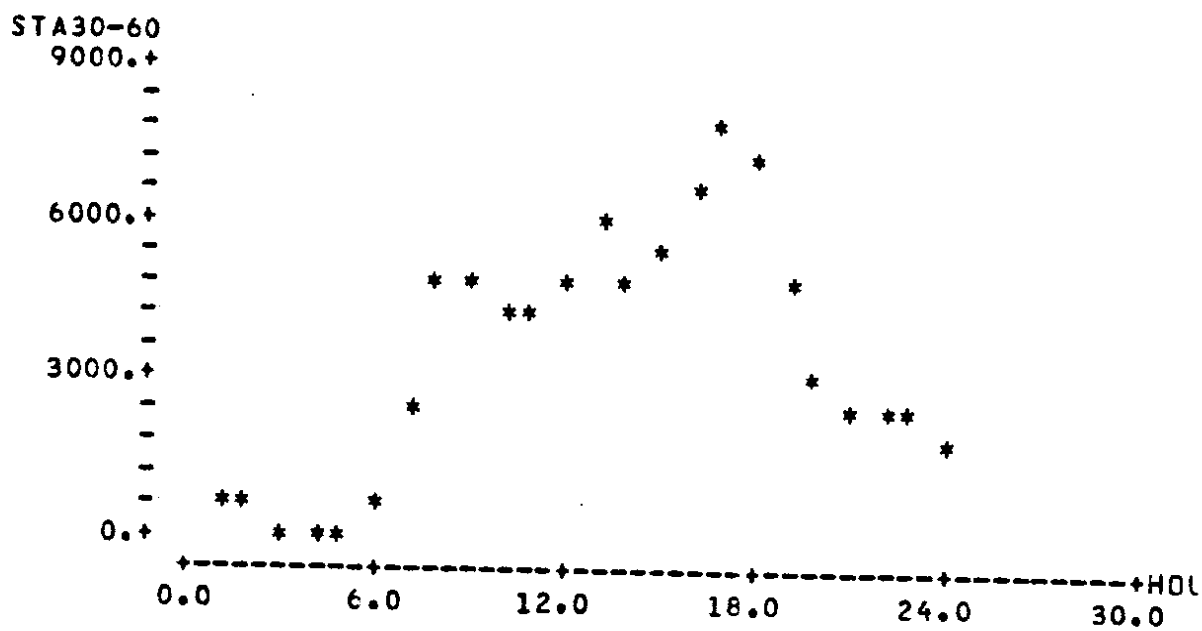
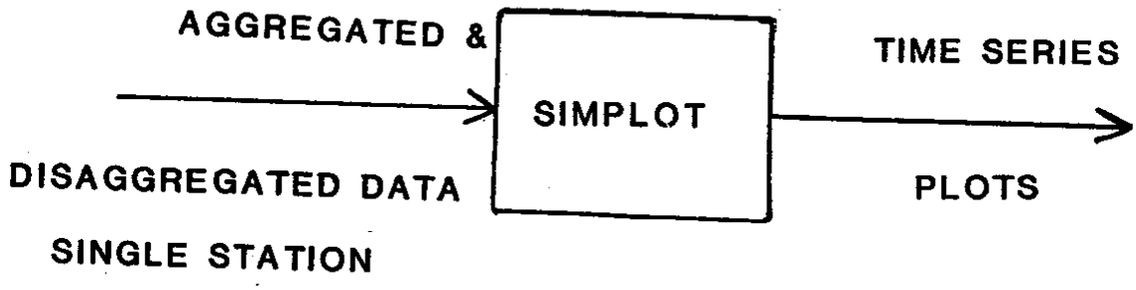


Figure 10

APPLICATION EXAMPLE: SIMPLOT



APPLICATION EXAMPLE: PICTURE

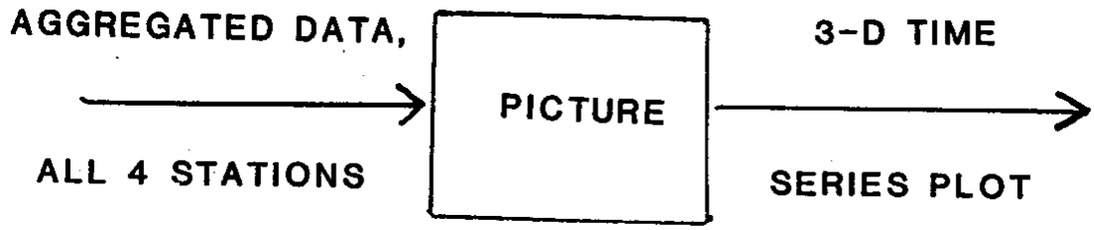


Figure 11

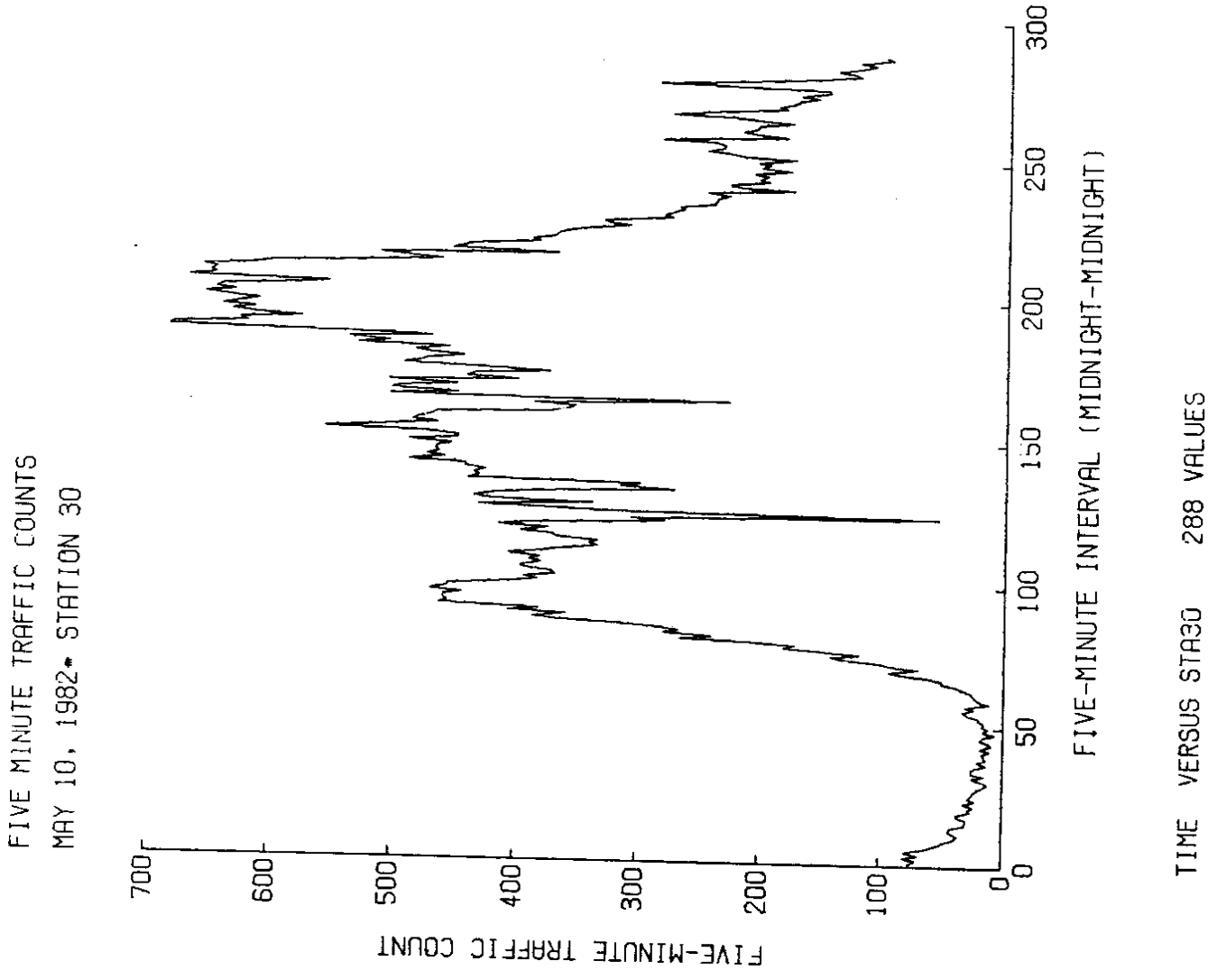

FIVE MINUTE TRAFFIC COUNTS
MAY 10, 1982* STATION 30
FIVE-MINUTE TRAFFIC COUNT
700
600
500
400
300
200
100
0
50
100
150
200
250
300
FIVE-MINUTE INTERVAL (MIDNIGHT-MIDNIGHT)
TIME VERSUS STA30 288 VALUES

Figure 12

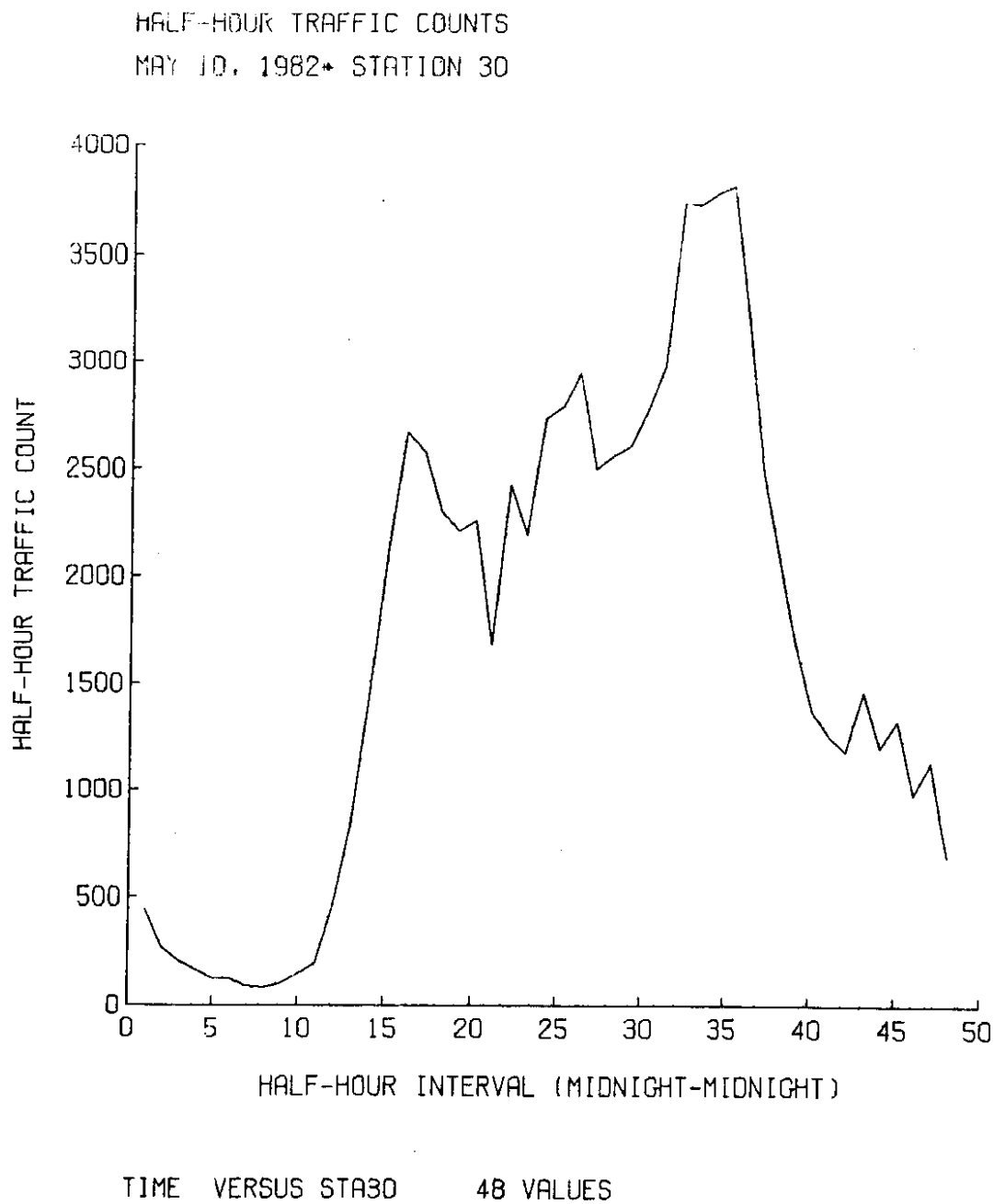

HALF-HOUR TRAFFIC COUNTS
MAY 10, 1982* STATION 30
HALF-HOUR TRAFFIC COUNT
4000
3500
3000
2500
2000
1500
1000
500
0
0
5
10
15
20
25
30
35
40
45
50
HALF-HOUR INTERVAL (MIDNIGHT-MIDNIGHT)
TIME VERSUS STA30 48 VALUES

Figure 13

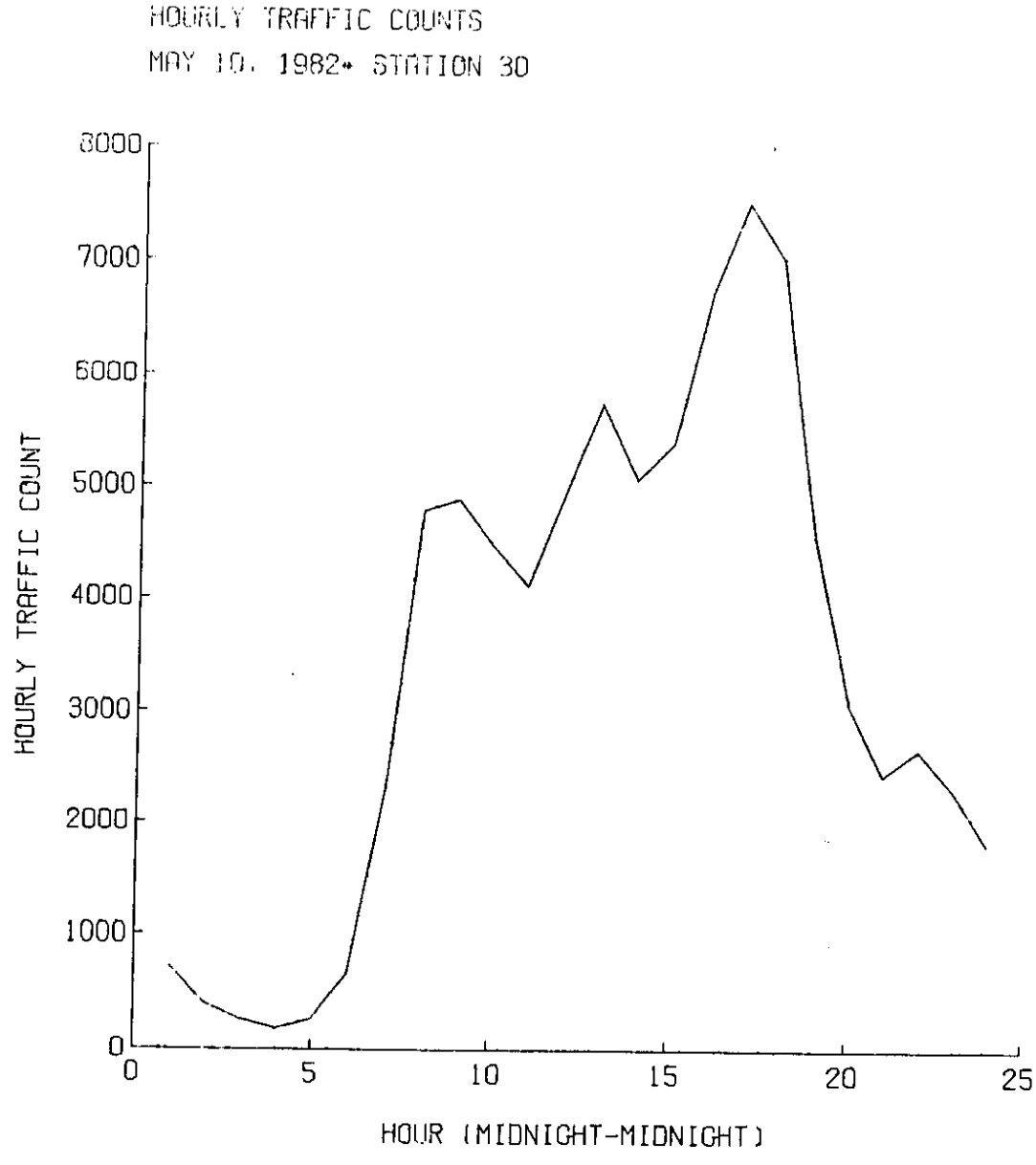
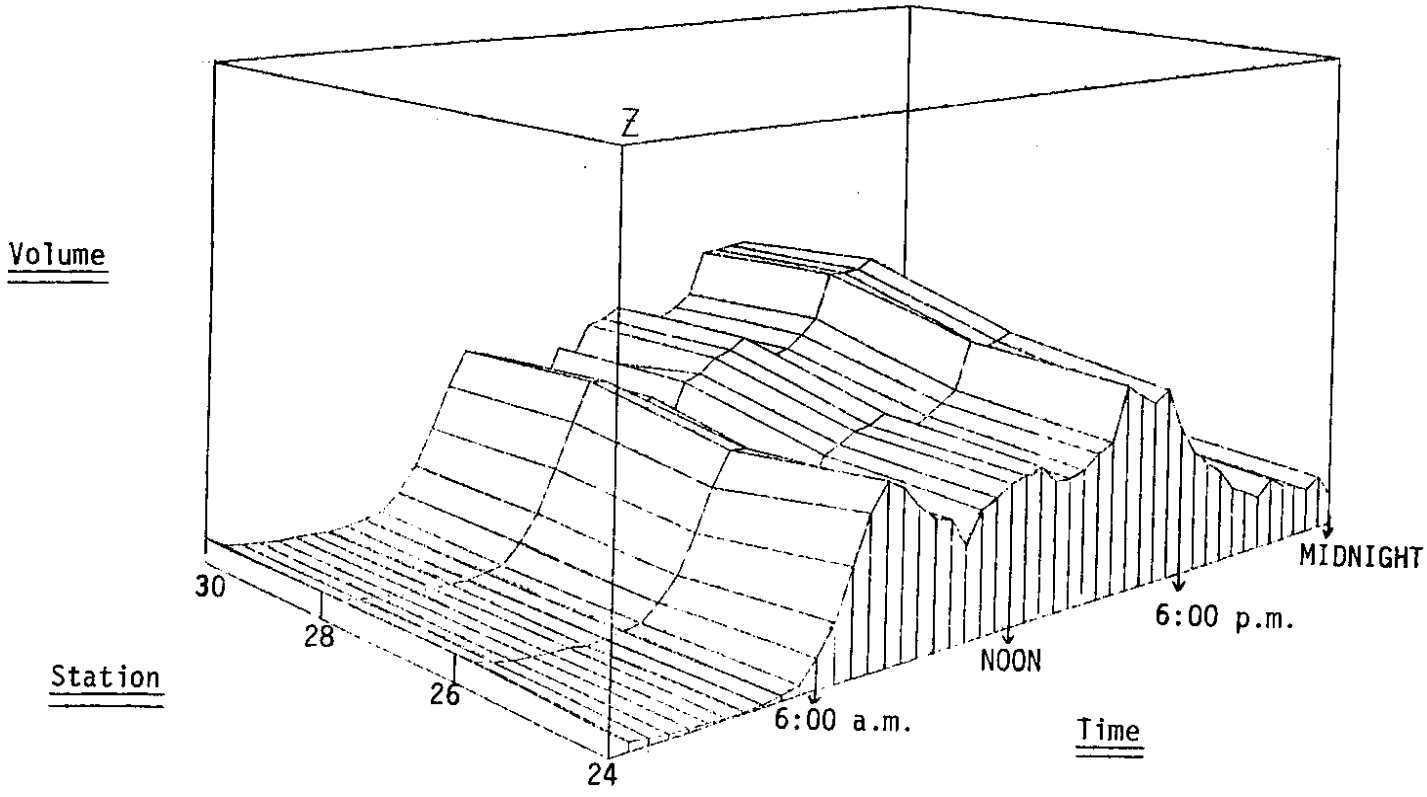

HOURLY TRAFFIC COUNTS
MAY 10, 1982* STATION 30
8000
7000
6000
5000
4000
3000
2000
1000
0
HOURLY TRAFFIC COUNT
0
5
10
15
20
25
HOUR (MIDNIGHT-MIDNIGHT)
TIME VERSUS STA30 24 VALUES

Figure 14



Half-hour Volumes: May 10, 1982

Figure 15

peak-hour volume divided by twelve times the peak five-minute volume. The same calculations are then performed to calculate the afternoon peak-hour factor. The morning and afternoon peak-hour percents are also calculated during this example session. The same calculations were performed for all four stations and a summary of the results from this MINITAB session is shown in Figure 9. A simple MINITAB plot of hourly traffic counts versus time for station 30 is shown in Figure 10.

Figure 11 summarizes two additional applications examples that were performed. A simple plotting routine called SIMPLOT was used to obtain time series plots for each station individually. A more involved plotting routine called PICTURE produced a three-dimensional time-series plot for all four stations. The results of these applications examples are illustrated in Figures 12 through 15.

Appendix A gives the current User's Guide for retrieval and analysis of the volume and lane occupancy data.

An example application given in Appendix B illustrates some of the potential of the application software available at the University of Washington. Pages 5 and 6 of the ACC documentation included in Appendix C lists the graphics, statistics, and data management software available and their documentation numbers.

APPLICATIONS

The Freeway Information System (FIS) developed by the current WSDOT-sponsored research project is presently being used by an NSF-sponsored project to analyze the impacts of ramp controls on I-5. This project uses time series intervention analysis to isolate the ramp control effects while controlling for other factors such as growth trends and weather. A similar approach is planned for a WSDOT research project to analyze the impacts of ramp controls and a new HOV ramp lane onSR 520. The system will also be a valuable data source for future WSDOT research projects.

Another application is the planned use of the FIS by the TSMC to get summary statistics such as ADT when needed. It can also serve as a resource for other agencies and WSDOT staff who require such summary statistics.

In addition to the above applications of the FIS, the data base that has been developed is a planned resource for a TRAC-developed short course in applied statistics to be offered to WSDOT staff.

APPENDICES

APPENDIX A

USER'S GUIDE

TELECOMMUNICATIONS LINK:

TRAFFIC SYSTEMS MANAGEMENT CENTER AND UNIVERSITY OF WASHINGTON

INTRODUCTION

The Freeway Information System (FIS) is maintained cooperatively by the Washington State Department of Transportation through the Traffic Systems Management Center (TSMC) and the Department of Civil Engineering of the University of Washington. The primary data available from the system currently consists of five-minute freeway traffic counts collected automatically throughout the Seattle Metropolitan area. Appendix A1 contains a list of the active counter stations. These counts have been made 24-hours a day since July 1, 1981, and are stored on computer tapes housed at the University of Washington's Academic Computer Center. FREELD, a computer program written at the University, allows a user to read selected subsets of this data into UWRIM, a relational database management system. With UWRIM, a user can organize the data for input into most of the University's applications programs or prepare the data for transfer to another computer system. It is recommended that users have some familiarity with the University's Cyber computer system and UWRIM. This can be obtained from the NOS User's Guide (Document N10) and the UWRIM Primer (Document N509) available from the Academic Computer Center.

GETTING STARTED

Before accessing the FIS, a user needs an account on the University's Cyber computer system and permission to access the FIS tapes. User accounts can be established by contacting the Production and Accounts Office at the ACC, telephone number 543-8925. Once the user has been issued a user number, tape access can be obtained by calling the Department of Civil Engineering, 543-7331.

READING THE TAPES

The FREELD program can be run both interactively and in batch mode. For interactive use, log in to the Cyber system and then enter the following commands:

```
F  >  ATTACH, FILESET = SURFS ./   UN = BBRQ000
F  >  GF, BLDPROC
F  >  BEGIN, BLDBASE, BLDPROC, "VSN"
```

Where "VSN" denotes the Volume Serial Number of the appropriate data tape. A list of available tapes appears in Appendix A2. The program will now prompt you for ranges of dates, times and station numbers which define your data set. Dates should be entered in the form "year/month/day"; e.g., 82/04/23 denotes April 23, 1982. Times should be entered as four digit integers. For instance, 0005 denotes the five-minute interval ending five minutes after midnight, 1025 denotes the five minute interval ending at 10:25 A.M. and 1745 denotes the interval ending at 5:45 P.M. See Appendix A for a list of station numbers. Figure 1A shows a sample interactive session. Note that only contiguous groups of days, times and stations can be loaded in any single run of FREELD. To read additional data sets to your database during the same interactive session, simply enter

```
F > FREELD
```

and you will be prompted for additional dates, times and stations.

Retrieving large data sets using FREELD is fairly expensive, while the cost of running FREELD as a batch job after 6:00 P.M. is about half of the cost of an interactive job. The NOS User's Guide gives details for creating and submitting batch jobs. Figure 2A shows a batch job file which performs the same task as the interactive job shown in Figure 1A.

Figure 1A.
Example Interactive Session Using FREELD Program.

```
F> GET,FILESET=SURFS/UN=BBRQ000
F> GF,BLDPROC
F> BEGIN,BLDBASE,BLDPROC,ZU70

  THE DATA TAPE IS BRING REQUESTED
  PLEASE WAIT

  THE TAPE IS AVAILABLE
  PLEASE GIVE THE LIMITS OF THE DATA

  WHAT IS THE START DATE:
? 82/05/10

  WHAT IS THE END DATE:
? 82/05/10

  WHAT IS THE START TIME:
? 0005

  WHAT IS THE END TIME:
? 2400

  FROM STATION NUMBER:
? 23

  TO STATION NUMBER:
? 30

  THE DATA IS BEING LOADED

82/05/10 IS BEING LOADED

  THE PROGRAM HAS FINISHED LOADING

  IF YOU WISH TO ADD MORE DATE TYPE
  FREELD (AND A RETURN)
  THE THREE DATABASES ARE LOCAL FILES

F>
```

After using the FREELD program, the user's data set is stored in three local files named FREEDB1, FREEDB2, and FREEDB3. These are binary files which can be interpreted using UWRIM, the University's relational database system. If a user is working with more than one database, it is advised that the FREEDB files be saved permanently under different names, as shown in Figure 2A.

Figure 2A.
Batch Job Which Reads Data From Stations 23 Thrugh 30 on May 10, 1982
and
Saves the Database in Files DEMDAT1, DEMDAT2 and DEMDAT3.

```
/JOB
TAPREAD, T2000, P0.
/ACCOUNT
GET,FILESET=SURFS/UN=GDZM000.
GF,BLDPROC.
BEGIN,BLDBASE,BLDPROC,ZU70.
SAVE,FREEDB1=DEMDAT1.
SAVE,FREEDB2=DEMDAT2.
SAVE,FREEDB3=DEMDAT3.
/EOR
82/05/10
82/05/11
0005
2400
23
30
```

The TSMC's data collection system consists of 1700 individual magnetic detection loops embedded in the pavement. Each of these loops records data from one freeway lane. The loops are organized into the stations listed in Appendix A1, with each station generally containing more than one loop. In order to keep track of what loops correspond to what stations, the FREELD program loads to relations STATDOC and LOOPDOC into the FREEDB database from files stored in the SURFS fileset. The actual data is then loaded into a relation called FREEDAT from the computer tapes. Figure 3A shows a partial listing of a typical FREEDAT relation.

The organization of the data in FREEDAT may not be appropriate for a given data use. Using the relational operations described in the UWRIM Reference Manual, new relations containing more useful data organizations can be created. Figure 4A shows a batch computer job which creates a new relation called STAT30 generated from the FREEDAT relation shown in Figure 3A. The actual traffic counts stored in the LOOPVAL attribute in FREEDAT are now stored as separate attributes, one for each loop making up Station 30. Figure 5A shows a partial listing of this new relation.

Once the data has been organized appropriately, it is easy to generate data files which can provide input to the University's applications programs. UWRIM's REPORT module allows the user to define formats for outputting data to printers, CRT screens, or local files. Data written to a local file can then be saved permanently for repeated use by applications programs. Figure 6A shows a set of UWRIM commands which define a report format called STATOUT and then use this format to

write the STAT30 relation to a file called ST30OUT. Figure 7 shows a partial listing of this file. The contents of ST30OUT can be input directly into most of the University's statistical and graphics software, including MINITAB, SPSS, SIMPLOT, and ASPEX.

USER SUPPORT

This User Guide may leave some of your questions unanswered. If so, contact:

Gary Davis
Civil Engineering, FX-10
University of Washington
(206) 543-7310

Figure 3A.
Form of Data Stored in FREEDAT Relation
After Being Read By The FREELD Program.

DATE	TIME	STATIONS	LOOPNUM	LOOPVAL
82/05/10	1600	23	68	71
82/05/10	1600	23	69	115
82/05/10	1600	23	70	117
82/05/10	1600	23	71	125
82/05/10	1600	24	72	78
82/05/10	1600	24	73	124
82/05/10	1600	24	74	137
82/05/10	1600	24	75	165
82/05/10	1600	25	76	0
82/05/10	1600	25	77	1
82/05/10	1600	25	78	2
82/05/10	1600	25	79	28
82/05/10	1600	26	80	129
82/05/10	1600	26	81	151
82/05/10	1600	26	82	137
82/05/10	1600	26	83	115
82/05/10	1600	27	84	58
82/05/10	1600	27	85	0
82/05/10	1600	27	86	4
82/05/10	1600	27	87	0
82/05/10	1600	27	88	127
82/05/10	1600	28	89	124
82/05/10	1600	28	90	163
82/05/10	1600	28	91	160
82/05/10	1600	28	92	166
82/05/10	1600	29	93	39
82/05/10	1600	29	94	0
82/05/10	1600	29	95	0
82/05/10	1600	29	96	8
82/05/10	1600	29	97	0
82/05/10	1600	30	98	105
82/05/10	1600	30	99	147
82/05/10	1600	30	100	153
82/05/10	1600	30	101	171
82/05/10	1605	23	68	71
82/05/10	1605	23	69	111
82/05/10	1605	23	70	139
82/05/10	1605	23	71	145
82/05/10	1605	24	72	59
82/05/10	1605	24	73	130
82/05/10	1605	24	74	143

Figure 4A.
Batch Job Which Creates the STAT30 Relation From the FREEDAT Relation.

```
/JOB
RLKRNCH, T1000
/ACCOUNT
GET, DEMDAT1, DEMDAT2, DEMDAT3
PUBLIC,UWRMLIB.
LIBRARY,UWRMLIB.
UWRIM.
REPLACE,FREEDB1=NANDTB1.
REPLACE,FREEDB2=NANDTB2.
REPLACE,FREEDB3=NANDTB3.
/EOR
OPEN FREEDB=NANDTB
PROJECT T2 FROM STATDOC USING STATIONS, LOOP1, +
LOOP2, LOOP3, LOOP4 WHERE STATIONS EQ 30
PROJECT T2 FROM FREEDAT USING ALL +
WHERE STATIONS EQ 30
JOIN T1 USING STATIONS WITH T2 USING STATIONS +
FORMING T3
RENAME STATIONS TO STAT2 IN T3
PROJECT FREEL1 FROM T3 USING DATE, TIME, STATIONS, LOOPVAL +
WHERE LOOPNUM EQA LOOP1
RENAME LOOPVAL TO LOOPCT1 IN FREEL1
PROJECT FREEL2 FROM T3 USING DATE, TIME, STATIONS, LOOPVAL +
WHERE LOOPNUM EQA LOOP2
RENAME LOOPVAL TO LOOPCT2 IN FREEL2
PROJECT FREEL3 FROM T3 USING DATE, TIME, STATIONS, LOOPVAL +
WHERE LOOPNUM EQA LOOP3
RENAME LOOPVAL TO LOOPCT3 IN FREEL3
PROJECT FREEL4 FROM T3 USING DATE, TIME, STATIONS, LOOPVAL
WHERE LOOPNUM EQA LOOP4
RENAME LOOPVAL TO LOOPCT4 IN FREEL4
UNION FREEL1 WITH FREEL2 FORMING T4 USING DATE, TIME, STATIONS, +
LOOPCT1, LOOPCT2
UNION FREEL3 WITH T4 FORMING T5 USING DATE, TIME, STATIONS, +
LOOPCT1, LOOPCT2, LOOPCT3
UNION FREEL4 WITH T5 FORMING STAT30 USING DATE, TIME, STATIONS, +
LOOPCT1, LOOPCT2, LOOPCT3, LOOPCT4
REMOVE T1
REMOVE T2
REMOVE T3
REMOVE T4
REMOVE T5
LISTREL STAT30
QUIT
```

Figure 5A.
Form of Data After Being Rearranged Using UWRIM Relational Algebra

DATE	TIME	STATIONS	LOOPCT1	LOOPCT2	LOOPCT3	LOOPCT4	
82/05/10	1600	30	105	147	153	171	
82/05/10	1605	30	123	157	157	175	
82/05/10	1610	30	131	163	156	181	
82/05/10	1615	30	112	155	167	181	
82/05/10	1620	30	118	170	169	183	
82/05/10	1625	30	116	166	157	184	
82/05/10	1630	30	117	168	150	176	

Figure 6A. UWRIM Commands to Generate An Output File.

```
R > REPORTS
R > DEFINE STATOUT FOR STAT30
R > LAYOUT
R > LOOPCT1   1   1   I   6
R > LOOPCT2   1   10  I   6
R > LOOPCT3   1   20  I   6
R > LOOPCT4   1   30  I   6
R > END
R > OUTPUT   ST30OUT
R > PRINT STATOUT FROM STAT30 SORTED BY TIME
```

Figure 7A.
Sample Output File Created Using UWRIM's REPORT Module.

13	38	18	7
15	29	19	7
12	29	22	17
10	24	18	16
10	26	29	14
8	25	22	12
7	29	19	4
4	20	21	5
6	21	14	7
9	17	10	3
5	13	11	7
5	19	12	3
11	14	14	4
10	15	13	4
3	16	10	2
5	12	11	1
5	14	7	3
5	15	11	5
4	17	13	4
1	15	8	2
6	9	12	1
3	12	8	1
6	16	6	4
2	13	4	3
3	14	6	5
6	9	7	3
5	9	7	3
6	9	3	3
3	8	1	4
4	8	0	1

Appendix A1
Active Detector Stations

1

STATIONS	ROUTE	PLACE	MILE	TY	QUEST
1	SR 5	LK CITY SB	170.7000	RM	ES12.4
2	SR 5	LK CITY SB	170.7000	SB	ES12.4
3	SR 5	OREGON	162.3500	SB	ES 2
4	SR 5	OREGON	162.3500	NB	ES 2
5	SR 5	SPOKANE	163.0300	SB	ES 3
6	SR 5	SPOKANE	163.0300	NB	ES 3
7	SR 5	HOLGATE	163.9500	SB	FC 2
8	SR 5	HOLGATE	163.9500	NB	FC 2
9	SR 5	DEARBORN	164.6600	SB	ES 4
10	SR 5	DEARBORN	164.6600	SB	ES 4
11	SR 5	DEARBORN	164.6600	NB	ES 4
12	SR 5	DEARBORN	164.6600	NB	ES 4
13	SR 5	YESLER	165.1300	SB	ES 6
14	SR 5	YESLER	165.1300	SB	ES 6
15	SR 5	NE 145TH	174.5000	RM	ES18.8
16	SR 5	NE 145TH	174.5000	SB	ES18.8
17	SR 5	SENECA	165.4900	SB	FC 5
18	SR 5	SENECA	165.4900	SB	FC 5
19	SR 5	SENECA	165.4900	NB	FC 5
20	SR 5	SENECA	165.4900	NB	FC 5
21	SR 5	8TH AVE	165.8000	SB	ES 7
22	SR 5	8TH AVE	165.8000	NB	ES 7
23	SR 5	DENNY	166.3400	SB	ES 8
24	SR 5	DENNY	166.3400	NB	ES 8
25	SR 5	MERCER	167.0000	SB	ES 9
26	SR 5	MERCER	167.0000	NB	ES 9
27	SR 5	GALER	167.3500	SB	ES 9.6
28	SR 5	GALER	167.3500	NB	ES 9.6
29	SR 5	NEWTON	167.6400	SB	ES10
30	SR 5	NEWTON	167.6400	NB	ES10
31	SR 5	ROANOKE	168.1000	SB	FC11
32	SR 5	ROANOKE	168.1000	NB	FC11
33	SR 5	HAMLIN	168.3300	SB	ES10.2
34	SR 5	HAMLIN	168.3300	NB	ES10.2
35	SR 5	SHIP CANAL	168.8400	SB	SIGNCB
36	SR 5	SHIP CANAL	168.8400	NB	SIGNCB
37	SR 5	NE 42ND	169.1800	NB	ES10.4
38	SR 5	RAVENNA	170.2300	SB	ES12
39	SR 5	RAVENNA	170.2300	NB	ES12
41	SR 5	NE 80TH	171.2400	NB	ES14
42	SR 5	NE 85TH	171.5800	SB	ES15
44	SR 5	NE 100TH	172.1600	SB	ES15.4
45	SR 5	NE 100TH	172.1600	NB	ES15.4
46	SR 5	NE 120TH	173.3000	SB	ES17
47	SR 5	NE 120TH	173.3000	NB	ES17
48	SR 5	NE 137TH	174.1600	SB	ES18.4
49	SR 5	NE 137TH	174.1600	NB	ES18.4
50	SR 5	NE 145TH	174.5800	NB	ES19
51	SR 5	NE 155TH	175.1100	SB	ES20

52	SR	5	NE 155TH	175.1100	NB	ES20
53	SR	5	NE 162ND	175.5000	SB	ES21
54	SR	5	NE 162ND	175.5000	NB	ES21
55	SR	5	NE 175TH	176.1200	NB	ES22
56	SR	5	NE 185TH	176.7300	SB	ES23
57	SR	5	NE 185TH	176.7300	NB	ES23
58	SR	5	NE 195TH	177.2100	SB	ES23.2
59	SR	5	NE 195TH	177.2100	NB	ES23.2
60	SR	5	S. 170TH	153.5100	SB	DS21
61	SR	5	S. 170TH	153.5100	NB	DS21
62	SR	5	S. 154TH	155.3800	SB	DS20
63	SR	5	S. 154TH	155.3800	NB	DS20
64	SR	5	DUWAMISH	156.5000	SB	DS19
65	SR	5	DUWAMISH	156.5000	NB	DS19
66	SR	5	S. RYAN	158.4300	SB	DS18
67	SR	5	S. RYAN	158.4300	NB	DS18
68	SR	5	SW 212TH	179.9600	SB	DS17
69	SR	5	SW 212TH	179.9600	NB	DS17
70	SR	5	SWAMP CREE	182.0300	SB	DS16
71	SR	5	SWAMP CREE	182.0300	NB	DS16
72	SR	5	SENECA	165.4900	RV	FC 5
73	SR	5	SENECA	165.4900	RV	FC 5
74	SR	5	8TH AVENUE	165.8000	RV	ES 7
75	SR	5	8TH AVENUE	165.8000	RV	ES 7
76	SR	5	DENNY WAY	166.3400	RV	ES 8
77	SR	5	DENNY WAY	166.3400	RV	ES 8
78	SR	5	MERCER	167.0000	RV	ES 9
79	SR	5	MERCER	167.0000	RV	ES 9
80	SR	5	GALER	167.3500	RV	ES 9.6
81	SR	5	GALER	167.3500	RV	ES 9.6
82	SR	5	NEWTON	167.6400	RV	ES10
83	SR	5	NEWTON	167.6400	RV	ES10
84	SR	5	ROANOKE	168.1000	RV	FC11
85	SR	5	ROANOKE	168.1000	RV	FC11
86	SR	5	HAMLIN	168.3300	RV	ES10.2
87	SR	5	HAMLIN	168.3300	RV	ES10.2
88	SR	5	NE 42ND	169.1800	RV	ES10.4
89	SR	5	NE 42ND	169.1800	RV	ES10.4
90	SR	5	RAVENNA	170.2300	RV	ES12
91	SR	5	RAVENNA	170.2300	RV	ES12
92	SR	5	NE 80TH	171.2400	RV	ES14
93	SR	5	NE 80TH	171.2400	RV	ES14
94	SR	5	NE 85TH	171.5800	RV	ES15
95	SR	5	NE 85TH	171.5800	RV	ES15
96	SR	5	NE 100TH	172.1600	RV	ES15.4
97	SR	5	NE 100TH	172.1600	RV	ES15.4
98	SR	5	SW 224TH	179.0100	SB	DS 25
99	SR	5	SW 224TH	179.0100	NB	DS 25
101	SR	90	TOLL PLAZA	5.950000	WB	DS 27
102	SR	90	TOLL PLAZA	5.950000	EB	DS 27
103	SR	90	TOLL PLAZA	5.950000	RV	DS 27

104	SR 90	TOLL PLAZA	5.950000	RV	DS 27
105	SR 90	TOLL PLAZA	5.950000	RV	DS 27
106	SR 90	TOLL PLAZA	5.950000	RV	DS 27
107	SR 90	RICHARD RD	10.70000	WB	DS 22
108	SR 90	RICHARD RD	10.70000	EB	DS 22
109	SR 90	EASTGATE	12.43000	WB	DS 23
110	SR 90	EASTGATE	12.43000	EB	DS 23
111	SR 90	188TH SE	14.65000	WB	DS 24
112	SR 90	188TH SE	14.65000	EB	DS 24
116	SR520	TOLL PLAZA	4.170000	WB	DS 26
117	SR520	TOLL PLAZA	4.170000	EB	DS 26
121	SR405	S. 154TH	.5800000	SB	DS 1
122	SR405	S. 154TH	.5800000	NB	DS 1
123	SR405	SR 167	1.680000	SB	DS 2
124	SR405	SR 167	1.680000	NB	DS 2
125	SR405	CEDAR RIV.	3.410000	SB	DS 3
126	SR405	CEDAR RIV.	3.410000	NB	DS 3
127	SR405	PARK ST	5.120000	SB	DS 4
128	SR405	PARK ST	5.120000	NB	DS 4
129	SR405	S.OF NE 30	6.290000	SB	DS 5
130	SR405	S.OF NE 30	6.290000	NB	DS 5
131	SR405	N.OF NE 30	6.770000	SB	DS 6
132	SR405	N.OF NE 30	6.770000	NB	DS 6
133	SR405	S.OF 112TH	9.040000	SB	DS 7
134	SR405	S.OF 112TH	9.040000	NB	DS 7
135	SR405	COAL CREEK	10.55000	SB	DS 8
136	SR405	COAL CREEK	10.55000	NB	DS 8
137	SR405	N. OF I90	11.96000	SB	DS 9
138	SR405	N. OF I90	11.96000	NB	DS 9
139	SR405	MAIN ST	13.30000	SB	DS 10
140	SR405	MAIN ST	13.30000	NB	DS 10
141	SR405	NE 14TH	14.27000	SB	DS 11
142	SR405	NE 14TH	14.27000	NB	DS 11
143	SR405	NE 53RD	16.47000	SB	DS 12
144	SR405	NE 53RD	16.47000	NB	DS 12
145	SR405	SCL KIRK	19.39000	SB	DS 13
146	SR405	SCL KIRK	19.39000	NB	DS 13
147	SR405	JUANITA RD	22.68000	SB	DS 14
148	SR405	JUANITA RD	22.68000	NB	DS 14
149	SR405	DAMSON RD	28.98000	SB	DS 15
150	SR405	DAMSON RD	28.98000	NB	DS 15
151	SR 5	GALER	167.3500	RM	ES 9.6
152	SR 5	NEWTON	167.6400	RM	ES10
153	SR 5	ROANOKE	168.1000	RM	FC11
154	SR 5	ROANOKE	168.1000	RM	FC11
155	SR 5	HAMLIN	168.3300	RM	ES10.2
156	SR 5	HAMLIN	168.3300	RM	ES10.2
157	SR 5	NE 42ND	169.1800	RM	ES10.4
158	SR 5	RAVENNA	170.2300	RM	ES12
159	SR 5	NE 80TH	171.2400	RM	ES14
160	SR 5	NE 85TH	171.5800	RM	ES15

161	SR	5	NE 100TH	172.1600	RM	ES15.4
162	SR	5	NE 100TH	172.1600	RM	ES15.4
163	SR	5	NE 175TH	176.1200	RM	ES22
168	SR	5	NE 42ND	169.1800	AL	ES10.4
200	SR	5	236TH SW-S	178.1900	ON	ES24
201	SR	5	236TH SW-S	178.1900	SB	ES24
202	SR	5	236TH SW-S	178.1900	NB	ES24
203	SR	5	NE 110TH-N	172.8800	ON	ES16.4
204	SR	5	NE 110TH-N	172.8800	NB	ES16.4
205	SR	5	NE 175TH-S	176.0700	ON	ES21.6
206	SR	5	NE 175TH-S	176.0700	HV	ES21.6
207	SR	5	NE 175TH-S	176.0700	SB	ES21.6
208	SR	5	NE 47TH-S	169.4700	ON	ES11
209	SR	5	NE 47TH-S	169.4700	SB	ES11
210	SR	5	NE 47TH-S	169.4700	RV	ES11
211	SR	5	244TH SW-S	177.8400	ON	ES23.6
212	SR	5	244TH SW-S	177.8400	OF	ES23.6
213	SR	5	244TH SW-S	177.8400	SB	ES23.6
214	SR	5	244TH SW-S	177.8400	NB	ES23.6
215	SR	5	NE 85TH-N	171.4900	ON	ES14.4
216	SR	5	NE 85TH-N	171.4900	NB	ES14.4
220	SR	5	NE 44TH-S	169.2900	ON	ES10.6
221	SR	5	NE 44TH-S	169.2900	HV	ES10.6
222	SR	5	NE 44TH-S	169.2900	SB	ES10.6
223	SR	5	NE 205TH-S	177.6600	ON	ES23.4
224	SR	5	NE 205TH-S	177.6600	HV	ES23.4
225	SR	5	NE 205TH-S	177.6600	SB	ES23.4
226	SR	5	NE 205TH-S	177.6600	NB	ES23.4
227	SR	5	NE 130TH-S	173.7100	ON	ES18
228	SR	5	NE 130TH-S	173.7100	SB	ES18
229	SR	5	NE 130TH-S	173.7100	NB	ES18
230	SR	5	NE 52ND-N	169.7600	ON	ES11.4
231	SR	5	NE 52ND-N	169.7600	RV	ES11.4
232	SR	5	NE 52ND-N	169.7600	NB	ES11.4
233	SR	5	NE 110TH-S	172.8600	ON	ES16.2
234	SR	5	NE 110TH-S	172.8600	OF	ES16.2
235	SR	5	NE 110TH-S	172.8600	SB	ES16.2
236	SR	5	NE 110TH-S	172.8600	SC	ES16.2
237	SR	5	NE 47TH-N	169.4900	ON	ES11.2
238	SR	5	NE 47TH-N	169.4900	HV	ES11.2
239	SR	5	NE 47TH-N	169.4900	NB	ES11.2
240	SR	5	NE 107TH-S	172.6600	ON	ES16
241	SR	5	NE 107TH-S	172.6600	OF	ES16
242	SR	5	NE 107TH-S	172.6600	SB	ES16
243	SR	5	NE 107TH-S	172.6600	SC	ES16
244	SR	5	NE 107TH-S	172.6600	RV	ES16
245	SR	5	NE 107TH-S	172.6600	NB	ES16
246	SR	5	NE 83RD-S	171.3800	ON	ES14.2
247	SR	5	NE 83RD-S	171.3800	HV	ES14.2
248	SR	5	NE 83RD-S	171.3800	SB	ES14.2
249	SR	5	NE 56TH-S	170.0000	ON	ES11.6

250	SR	5	NE 56TH-S	170.0000	OF	ES11.6
251	SR	5	NE 56TH-S	170.0000	SB	ES11.6
252	SR	5	LAKE CTY-N	170.7600	ON	ES13
252	SR	5	SB 44TH W	180.6500	ON	ES30
253	SR	5	LAKE CTY-N	170.7600	OF	ES13
253	SR	5	SB 44TH W	180.6500	SB	ES30
254	SR	5	LAKE CTY-N	170.7600	RV	ES13
254	SR	5	NB 44TH W	180.6600	ON	ES31
255	SR	5	LAKE CTY-N	170.7600	SP	ES13
255	SR	5	NB 44TH W	180.6600	SB	ES31
256	SR	5	LAKE CTY-N	170.7600	NB	ES13

Appendix A2
Data Tapes Available Through FIS

VSN	First Date on Tape
ZU68	81/06/11
ZU69	81/12/02
ZU70	82/01/03
ZU71	82/05/24

APPENDIX B

EXAMPLE MINITAB SESSION

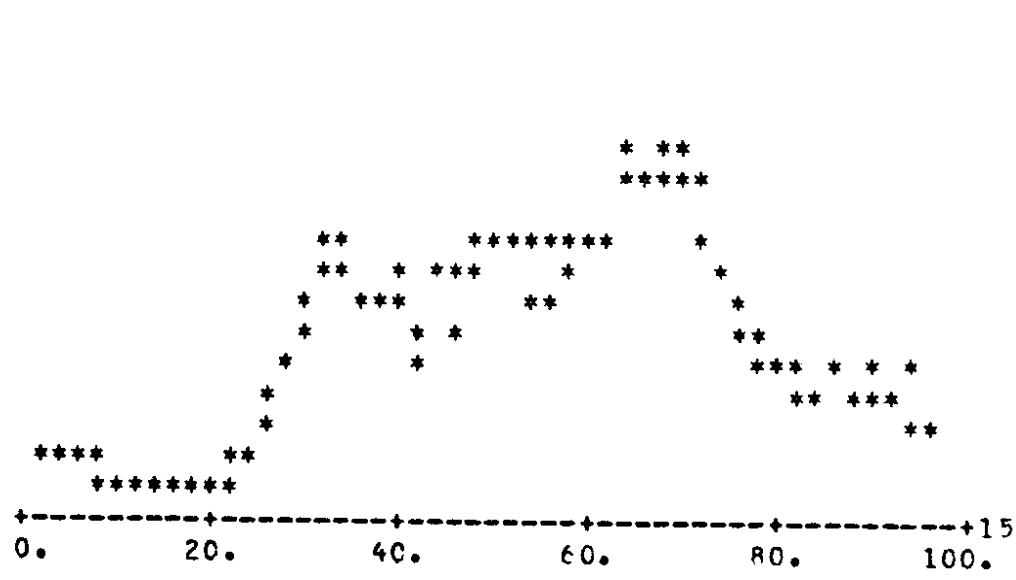
A SAMPLE INTERACTIVE SESSION USING THE STATISTICS PACKAGE MINITAB. DATA AGGREGATION IS DEMONSTRATED ALONG WITH SIMPLE PLOTTING AND SUMMARY STATISTICS. THE INPUT FILE WAS GENERATED USING THE FREEDB DATA BASE AND UWRIM.

```
-- NOTE READ LOOP DATA FOR STATION 30

-- READ 'DEM30' C1-C6
COLUMN        C1          C2          C3          C4          C5
COUNT        288         288         288         288         288
ROW
  1          30.        5.00         13.         38.         18.
  2          30.       10.00         15.         29.         19.
  3          30.       15.00         12.         29.         22.
  4          30.       20.00         10.         24.         18.
  .  .  .

COLUMN        C6
COUNT        288
            7.          7.          17.         16.  .  .  .

-- NOTE COMPUTE STATION TOTAL FOR EACH 5-MINUTE INTERVAL

-- LET C7=C3+C4+C5+C6

-- NOTE COMPUTE DAILY TOTAL TRAFFIC FOR STATION 30

-- SUM C7
   SUM      =      82146.

-- NOTE AGGREGATE OVER 15-MINUTE INTERVALS FOR PLOTTING

-- LAG C7,C8

-- LAG C8,C9

-- LET C10=C7+C8+C9

-- SET INTO C11

-- CHOOSE 1 IN C11,C10,C12,C8

-- PRINT C8
COLUMN        C8
COUNT         96
```

226.00	214.00	157.00	114.00	116.00
95.00	92.00	78.00	77.00	50.00
55.00	75.00	49.00	44.00	40.00
43.00	46.00	57.00	86.00	63.00
74.00	122.00	197.00	256.00	374.00
456.00	651.00	783.00	962.00	1151.00
1302.00	1366.00	1384.00	1196.00	1133.00
1167.00	1168.00	1039.00	1072.00	1185.00
977.00	712.00	1191.00	1234.00	885.00
1309.00	1313.00	1423.00	1399.00	1393.00
1481.00	1465.00	1417.00	1094.00	1117.00
1446.00	1356.00	1251.00	1398.00	1391.00
1470.00	1512.00	1912.00	1822.00	1958.00
1874.00	1917.00	1865.00	1867.00	1951.00
1729.00	1469.00	1271.00	1212.00	1100.00
984.00	886.00	809.00	718.00	653.00
643.00	613.00	581.00	599.00	706.00
756.00	608.00	592.00	703.00	621.00
510.00	470.00	715.00	411.00	371.00
321.00				

```
-- NOTE C8 NOW CONTAINS THE 15-MINUTE COUNTS FOR STATION 30

-- NAME C7 'STA30-05'

-- NAME C8 'STA30-15'

-- NOTE GENERATE A TIME AXIS

-- GENE 96,C20

-- NAME C20 '15 MIN'
```

-- PLOT C8 VS C20
STA30-15



-- NOTE NOW WE'LL COMPUTE SOME SUMMARY STATISTICS FOR THIS STATION

-- NOTE FIRST WE'LL AGGREGATE OVER 60-MINUTE INTERVALS

-- LAG C7,C9

-- LAG C9,C10

-- LAG C10,C11

-- LAG C11,C12

-- LAG C12,C13

1-- LAG C13,C14

-- LAG C14,C15

-- LAG C15,C16

-- LAG C16,C17

-- LAG C17,C18

-- LAG C18,C19

```
-- LET C21=C7+C9+C10+C11+C12+C13+C14+C15+C16+C17+C18+C19

-- SET INTO C22

-- CHOOSE 1 C22,C21,C23,C9


-- PRINT C9
COLUMN         C9
COUNT          24
      711.00       381.00       257.00       176.00       252.00
      649.00      2264.00      4781.00      4880.00      4464.00
     4114.00      4930.00      5738.00      5054.00      5386.00
     6716.00      7514.00      7016.00      4567.00      3066.00
     2436.00      2662.00      2304.00      1818.00

-- NOTE C9 NOW CONTAINS THE HOURLY TRAFFIC VOLUMES FOR STATION 30

-- LET C10=C21

1-- NOTE NEXT WE'LL COMPUTE MORNING AND AFTERNOON PEAK HOUR FACTORS

-- PICK 1 138 C10,C11

-- PICK 139 276 C10,C12

-- PICK 1 144 C7,C13

-- PICK 145 288 C7,C14

-- NOTE COMPUTE MORNING PEAK 5-MINUTES

-- MAXIMUM C13,K1
   MAXIMUM =       488.00

-- PRINT K1
   K1          488.000

-- NOTE COMPUTE MORNING PEAK HOUR

-- MAXIMUM C11,K2
   MAXIMUM =       5260.0

-- PRINT K2
   K2          5260.00

-- NOTE COMPUTE MORNING PEAK-HOUR FACTOR

-- LET K3=K2/(12*K1)
```

```
-- PRINT K3
   K3          .898224

-- NOTE COMPUTE AFTERNOON PEAK 5-MINUTES

-- MAXIMUM C12,K4
   MAXIMUM =        7600.0

-- PRINT K4
   K4          7600.00

-- NOTE COMPUTE AFTERNOON PEAK HOUR

-- MAXIMUM C14,K5
   MAXIMUM =        684.00

-- NOTE COMPUTE AFTERNOON PEAK 5-MINUTES

-- MAXIMUM C14,K4
   MAXIMUM =        684.00

-- PRINT K4
   K4          684.000

-- NOTE COMPUTE AFTERNOON PEAK HOUR

-- MAXIMUM C12,K5
   MAXIMUM =        7600.0
1-- PRINT K5
   K5          7600.00

-- NOTE COMPUTE AFTERNOON PEAK-HOUR FACTOR

-- LET K6=K5/(12*K4)

-- PRINT K6
   K6          .925926

-- OUTUNIT 6

-- NOTE COMPUTE MORNING PEAK HOUR AS PERCENT OF DAILY TOTAL

-- LET K7=K2/82146

-- PRINT K7
   K7         .0640323

-- NOTE COMPUTE AFTERNOON PEAK HOUR AS PERCENT OF DAILY TOTAL

-- LET K8=K5/82146
```

```
-- PRINT K8
   K8         .0925182

-- STOP

*** MINITAB *** STATISTICS DEPT * PENN STATE UNIV. * RELEASE 81.1 *
STORAGE AVAILABLE  68121
```

APPENDIX C

ACC DOCUMENTATION

ACC DOCUMENTATION

The following list contains all current documentation available at the Academic Computer Center (ACC) and where it is located. For a complete description of the documentation system, obtain a copy of Announcement A3, which is available in the self-service documentation bins or on WRITEUP, both of which are described below.

To keep you informed of the status and location of each document we have created the following categories. All documentation is available for reference in the Computing Information Center.

B — Self-service documentation bins--located on the first floor of the ACC these bins contain most of our general information documents and also some introductory documents which contain printed sample output for machine-retrievable documentation (WRITEUP).

C — Computing Information Center (CIC)--also located on the first floor of the ACC, tne CIC contains all of our documentation for reference, and many documents for checkout. Documents marked with this category are found only in the CIC.

W — WRITEUP--to obtain a document from the computer, log in and enter:

```
WRITEUP,doc/qualifier
```

where "doc" is the document number and "qualifier" can be any of the qualifiers listed in technical note T1. If you do not specify any qualifiers (for example,

```
WRITEUP,T1
```

---

* This document supersedes tne version dated February 1984. Changes are marked with change bars in the left margin.

your document will be filed according to the fourth letter of your user number in the output bins on the first floor of the ACC.

$x.xx These documents are for sale at the reception desk on the second floor of the ACC.

! R These documents are for handout at the reception
! desk.

Document dates marked with an asterisk have minor changes. These changes are marked with change bars within the document. Using the CIC's reference copy, you can update your version of the document, or decide to obtain a copy of the new version.

The number of pages for each document is listed in brackets after the document title to help you decide whether you should print the document using the WRITEUP program, or use the reference copies available in the CIC.

GENERAL ANNOUNCEMENTS

	Number	Title	Date	Location
	A1	Service Hours [3]	Nov 1983	W/B
	A2	Access Policy [2]	Feb 1981	W/B
	A3	ACC Documentation [4]	Nov 1983*	W/B
	A4	Guidelines for the Application of the Interactive Instructional Computing Facilities [3]	Aug 1983*	W/B
	A5	Keypunching [28]	Jan 1983	W/B
	A7	Rate Schedule [9]	Sep 1983	W/B
	A8	User Number Expiration Policy [3]	Jan 1984*	W/B
	A10	Academic Computer Center Policies [2]	Aug 1983	W/B
	A12	Permanent File Backup [2]	Aug 1983	W/B
	A13	Refund Policy [3]	Dec 1980	W/B
	A36	Computer Readable Class Lists [11]	Aug 1980	W/B
!	A64	Guidelines for Guest Lectures [2]	Feb 1984	W/B
	A77	Consultation Services [4]	Aug 1981	W/B
	A100	Short Course Catalog [11]	Apr 1983	W
	A200	Resource Directory [29]	Nov 1983	W/R

CYBER NOS DOCUMENTS[1]

Number	Title	Date	Location
	General		
N1	NOS/BE to NOS Conversion Guide [45]	Dec 1980	W
N2	Getting Started on the Cyber [3]	Jul 1983	W/B
N6	CDC NOS Manuals [5]	May 1983	W/B
N7	CDC Price List [3]	May 1983	W
N10	Introduction to Interactive Computing on the Cyber [57]	Apr 1983	W/$3.25
N19	UN Manage [42]	Jul 1982	W
N20	Budget Managing [24]	Dec 1981	W
N25	UW MAIL Facility [16]	Dec 1982	W
N26	TALK Users Guide [12]	Dec 1983*	W
N34	ICE Tutorial Guide [31]	Aug 1983	W
N35	ICE Reference Manual (Draft) [85]	Nov 1980	W
N36	QUILL Users Guide [101]	Dec 1983*	W
N37	RNF Reference Manual [101]	Sep 1981	W/$5.00
N38	SPELL [6]	Sep 1982	W
N45	DOTSYS Text-to-Braille Interpreter [18]	Oct 1981	W
N46	TAGS [24]	Dec 1982	W
N47	MABEL - Mailing Labels Program [20]	Sep 1981	W
N54	FILESET Users Guide [19]	Jan 1983	W
N62	Introduction to UPDATE [6]	Feb 1981	W
N67	The CALLPRG Package [8]	Sep 1981	W
N69	CCL - Cyber Control Language [24]	Jan 1981	W/$1.50
N80	Tape Management System (TMS) [24]	Dec 1983*	W
N85	PF2TAPE/TAPE2PF Reference Manual [23]	Sep 1981	W/B
W4	UEDIT and LEDIT Text Editors [30] (to become N33)	Dec 1977	W/C
W4a	U/LEDIT Addendum [8] (to become N33)	Oct 1980	C

[1] NOS documents that do not have a number with an N prefix have not yet been converted from NOS/BE, our old CDC operating system. For the most part however, they apply with few changes to NOS. For changes to control statements, see document N10.

Languages

N110	Introduction to Fortran [8]	Jun 1982	W
N111	Programing Fortran on the Cyber: A Step Through [17]	Dec 1983	W
N115	MNF - Minnesota Fortran Compiler [44]	Dec 1980	W/$2.50
N121	UWLIB Fortran Library [100]	May 1983*	W/$5.00
N123	Run Time Memory Allocation with the Common Memory Manager [6]	Jul 1982	W
N125	PFORT Portable Fortran IV Verifier [3]	Aug 1981	W
N126	PFORT Reference Manual [32]	Aug 1981	C
N127	TIDY - Clean Up Your Fortran Programs [1]	Apr 1982	W
N130	PASCAL [103]	Jul 1981	! !
N131	PASCLIB [49]	Jul 1981	!W/$10.00!
N132	PTOOLS [32]	Jul 1981	! !
N157	SNOBOL [7]	Jan 1981	W
N166	CDC Software for Intel 8080 Microprocessor [24]	Jan 1982	W
N170	The Cyber C Compiler [7]	Jan 1984	W

Mathematics, Engineering, Operations Research, and Simulation

N212	The IMSL 9 Mathematical and Statistical Subroutine Library on the CDC System [38]	May 1983	W
N213	STATLIB--Fortran Subroutines for Statistical Analysis [12]	Nov 1981	W
N214	Introduction to the Boeing Library of Mathematical Routines [26]	Dec 1980	W
N216	The PORT Library [2]	Nov 1982	W
N222	ALSCAL-4 - Alternating Least Squares Approach to Scaling [3]	Jun 1981	W
N232	LLSQ (Linear Least Squares) [5]	Dec 1980	W
N233	LINPACK (Linear Analysis Packages) [3]	Jun 1980	W
N236	EISPACK - Matrix Eigensystem Routines [3]	Feb 1981	W
N237	ELLPACK - Elliptic Partial Differential Equation Solver [5]	Feb 1981	W
N242	Energard III: An Energy Accounting System [2]	Oct 1981	W
N262	EZLP Interactive Linear Programming [16]	Aug 1981	W
N266	Using MPOS4 on the CDC System [6]	Dec 1980	W
N282	GPSS Discrete Simulation Package [7]	Sep 1982	W
N284	Mini-DYNAMO [4]	Dec 1980	W
W29	SPICE Circuit Simulator Program [34] (to become N256)	Jun 1978	W
W29a	SPICE Sample Output [75] (to become N256)	Jun 1978	C

W34	SMIS (Symbolic Matrix Interpretive System [33] (to become N226)	Jan 1974	C
W47	MIMIC Digital Simulation Language [17] (to become N286)	Oct 1973	C

Graphics

N300	Introduction to Computer Graphics [26]	Jun 1983	W
N300A	Sample Graphs and Plots for N300 [10]	Jun 1983	B
N301	Graphics Laboratory [22]	Nov 1983	W
! N302	Introduction to the TEMPLATE Graphics Software [11]	Mar 1984	W
N303	PLOTREQ - Utility Program for Making Plots [23]	May 1983	W
N305	Introduction to the Altek Digitizer [22]	Dec 1983*	W
N315	The SGN Users Guide [20]	Jan 1984	W
N318	Introduction to SIMPLOT [13]	Nov 1982	W/B
N319	SIMPLOT Users Guide [64]	Jun 1983*	W
N321	SPSS PLOT [8]	Nov 1982	B
N336	SYMAP - A Computer Mapping Program [14]	Feb 1981	W/B
N338	Using ASPEX on the CDC [2]	Sep 1981	W
N341	Introduction to Basic Plotting Routines [5]	Mar 1983	W/B
N342	Basic Plotting Routines [25]	Mar 1983	W
N344	IGL - Interactive Graphics Library [3]	Aug 1981	W
N350	Tektronix Plot10 Software [4]	Oct 1981	W
N351	Getting Started with NCAR Graphics Software [4]	Apr 1982	W/B
N352	Introduction to the NCAR Graphics Software [17]	Mar 1983	W
N355	UMPLOT Subroutines [15]	Oct 1981	W/B
N356	UMPLOT for the CDC System [29]	Oct 1981	W/$2.25
N358	PICTURE Routine for 3-D Displays [8]	Jun 1983*	W/B
N378	IGP: The Tektronix PLOT10 Interactive Graphing Package on the Cyber System [9]	Jan 1983	W/B
N382	MOVIE.BYU Users Guide and Program Manuals [101]	Jun 1981	W/$7.00
N385	CAPTURE Graphics: Capturing Tektronix Plots [14]	Feb 1983	W
N386	Introduction to Previewing Drum Plotter Plots [11]	Apr 1983	W/B
N387	Computer Graphics: Previewing Drum Plotter Plots [38]	Apr 1983	W
W53	Numerical Plotting System Users Manual [88] (to become N348)	Aug 1977	C
W63	World Coastline Database and Mapping Program [16] (to become N366)	Mar 1980	! $3.00!

W63a	A Mapping Package: AMP 2.1 Users Guide [51]	Mar 1980	!W/$3.00!

Statistics

N410	Introduction to SPSS [38]	Dec 1982	W/$3.00
N411	Guide to CDC Version of SPSS8 [99]	Dec 1982	W
N412	University of Washington Extensions to SPSS [35]	May 1982	R
N415	SPSS Guide to Statistical Procedures #1 (Regression, Nonlinear) [28]	Nov 1982	$2.75
N416	SPSS Guide to Statistical Procedures #2 (Spectral, G3SLS, Tetrachoric, JFACTOR, Summary Tables) [70]	Nov 1982	$4.25
N420	SCSS: The NOS Implementation [8]	Feb 1982	W
N433	Introduction to MINITAB [2]	Jan 1984*	W
N433A	MINITAB 81 Interactive Statistics on the Cyber System [21]	Jan 1984	W
N433B	MINITAB 82 Data Analysis on the Cyoer System [23]	Jan 1984	W
N434A	MINITAB Reference Manual [154] (same as V434)	May 1981	W
N434B	MINITAB 82 Reference Manual [154]	Jan 1984	W
N441	BMDP-81 (CDC Version) [14]	Nov 1982	W
N443	BMDPFIL: Converting SPSS System Files to BMDP SAVE Files [20]	Aug 1983*	W
N451	GLIM - Generalized Linear Interactive Modeling [3]	Dec 1981	W
N467	LISREL - Analysis of Linear Structural Relationships [4]	Oct 1983	W
N469	TSP - Time Series Processor [3]	Feb 1982	W
W14	Computer-Assisted Class Recordkeeping [74] (to become N460)	Jun 1978	C
W16	CLUSTAN on the CDC System [6] (to become N461)	Jun 1979	W
W16a	CLUSTAN Users Manual [124]	Jan 1979	W
W16b	CLUSTAN Sample Problems [175]	Sep 1981	W
W16c	CLUSTAN Plot Samples [14]	Jan 1979	C

Data Management

N500	Introduction to Database Management [18]	Jul 1982	W/$1.50
N504	Using SYSTEM 2000 at the University of Washington [10]	Nov 1981	W
N506	Using SIR at the University of Washington [7]	Apr 1981	W
N508	Introduction to UWRIM [1]	Jul 1982	W
N509	UWRIM Primer [35]	Mar 1983*	W/$2.00
N510	UWRIM Reference Manual [126]	Apr 1982	W

N517	DATALIB Data Management System [1]	Apr 1982	W
N526	FAMULUS - Personal Documentation System [2]	Dec 1983*	W
N532	Beginner's Guide to SORT/MERGE [23]	Apr 1981	W/$1.50
N533	REFORM - Data Reformatting Program [17]	Jan 1984	W
N534	SAMPLE - Data Sampling Program [2]	Feb 1982	W
N565	DATABNK [2]	Dec 1982	W
N582	Users Guide to POLYGET [4]	Jun 1981	W
W10	KWOC Keyword Index and Concordance Program [68] (to become N524)	Dec 1977	C

Computer-Aided Instruction

N612	COMMON PILOT Reference Manual [70]	Aug 1981	W/$3.50

Cyber Technical Notes

T0	ACC Documentation [10]	Mar 1984*	W
T1	The WRITEUP Program [8]	Dec 1983	W/B
T2	ITEM [3]	Feb 1981	W
T3	COPYRM [3]	Jul 1983*	W
T5	Terminal Recovery [2]	Sep 1981	W
T7	Removable Packs [2]	Jul 1983*	W
T9	LISP Programming Language [6]	May 1981	W
T10	Telenet [4]	Jul 1981	W/B
T11	User Number Balance Program [2]	Mar 1981	W
T13	Cyber Interactive Debug (CID) [4]	May 1982	W
T14	MOVIE.BYU - Interactive Graphics Programs from Brigham Young University [15]	Jun 1981	B
T15	AMPDR--Data Retrieval from the World Database II [3]	May 1981	W
T16	The LQ Command [6]	Oct 1983*	W
T17	Microfiche [1]	Sep 1982	W
T18	Using NOS Efficiently [4]	May 1981	W
T19	BFMAN Utility to Access Billing Files [8]	Dec 1982	W
T20	Progress on FTN5 Compatible Libraries [2]	Nov 1983*	W
T21	Using the DISKWRITER Floppy Disk [7]	Feb 1982	W/B
T22	The LC Command [8]	Jun 1981	W
T23	History File Manager (HFMAN) [3]	Jun 1981	W
T24	CDC Printer Carriage Control Characters [2]	May 1981	W
T25	The LF Command [4]	Aug 1981	W
T26	How to Communicate with the Cyber System via Terminal or Micro/Mini Computer [11]	Oct 1983*	W/B
T27	RBF Site I/O Charging [4]	Jun 1981	W
T28	COPYAI/COPYIA [4]	Jun 1982	W

	T29	Copy Utilities on the CDC [7]	Nov 1982	W
	T30	The BINDMP Utility [2]	Jul 1981	W
	T33	COPYSF and COPYSR [3]	Sep 1981	W
	T34	Terminal Cluster Facility [5]	Mar 1983	W
	T35	Standard Operator Actions for Tape Problems [2]	Sep 1981	W
	T37	PRT - A Print Utility [9]	Jan 1984*	W
	T38	CPY - A General Copy Utility [3]	Sep 1981	W
	T40	Archiving Package [7]	Feb 1982	W
	T42	Special Forms [4]	Jul 1983*	W
	T43	File Transfers from VAX to CDC [3]	Sep 1981	W
	T44	PRMT - A Permit Utility [2]	Nov 1981	W
	T45	TRANS - A Copy Utility [3]	Nov 1981	W
	T46	NOS Level 543 [6]	Oct 1981	W
	T48	MAILSTP - Campus Mail Deliveries [4]	Dec 1981	W
	T49	SCN Users Guide [22]	Jan 1983	W
!	T52	Card Reader Error Processing [2]	Mar 1984	W/B
	T54	Converting to COBOL5 [3]	Jan 1984*	W
	T55	TIMEIN/TIMEOUT [4]	Mar 1982	W
	T57	Job Scheduling [2]	Jun 1982	W
	T58	How to Use Magnetic Tapes [16]	Jan 1984*	W
	T60	The Diablo Printer [1]	Dec 1982	W
	T60A	Diablo Print Wheels [1]	Nov 1982	B
	T61	Screen Mode for the ICE Editor [55]	Oct 1983	W
	T63	The R Command [5]	Jan 1983	W
	T64	The DFM, Dayfile Messages, Utility [2]	Feb 1983	W
	T66	The LT, List Terminals, Utility [4]	Mar 1983	W
	T67	The RCV, ReCeiVe, Utility [3]	Mar 1983	W
	T68	The MSG Command [4]	Apr 1983	W
	T69	MCOPY [6]	Sep 1983*	W
	T70	Remote Micro Facility (RMF) [16]	Oct 1983*	W
	T71	The LOGIN Procedure and OPTION Files [3]	Oct 1983	W
	T72	The Hayes Dial-Out Modem [4]	Oct 1983	W
!	T75	NOS 2.2 Conversion	Mar 1984	W
!	T76	UWRIM Updates	Mar 1984	W

VAX VMS DOCUMENTS

	Number	Title	Date	Location
!	V6	DEC Manuals for the VAX [9]	Mar 1984	W/B
	V10	Getting Started on the VAX [4]	Nov 1983*	W/B
!	V310	GWCORE User Document [46]	Jan 1982	W/C/$2.00
!	V410	SPSS Users Guide on the DEC VAX [19]	Sep 1981	W/$1.00
	V433	Introduction to MINITAB [8]	May 1981	W/B
!	V434	MINITAB 81 Reference Manual [154]		
!		(same as N434)	May 1981	W/$6.00

VAX Technical Notes

VAX Technical Notes are available on the VAX. Log in to the VAX and enter:

PRINT UW$DOC:TNxx

where "xx" is the number of the technical note. Your output will be filed in the VAX bins on the first floor of the ACC.

!	TN0	Index [2]	Feb 1984
	TN1	How to Share Files [3]	Oct 1983
	TN2	File Backup Policy [1]	Nov 1983
	TN3	How to Use Tapes [3]	Oct 1983
	TN4	DELETE vs. PURGE [1]	Mar 1981
	TN5	Remote Printers [1]	Jul 1983
	TN6	Moving Files from the CDC to the VAX [2]	Oct 1983
	TN7	Account Limits, Passwords and Permissions [2]	Jan 1983
	TN8	Users Guide [16]	Aug 1983
	TN9	Floppy Disks [1]	Oct 1983
	TN10	Phone Numbers, Terminal Settings, and Locations [1]	May 1983
!	TN11	Available Software [2]	Jan 1984
	TN12	Consultation Services [1]	May 1981
	TN13	TEKLIB: Tektronix Software [2]	Jul 1981
	TN14	TEKPLOT: A Tektronix Hardcopy Utility [2]	Jul 1981
!	TN15	PRNTXLIB: Printronix Graphics Library [8]	Jan 1984
!	TN16	PLOTREQ: Plotting on the Printronix Printers [1]	Jan 1984
!			
	TN17	DECNET (not available, under revision)	
	TN18	Moving Files from the Vax to the CDC [4]	Dec 1983
	TN19	Guidelines for the Application of the Interactive Instructional Computing Facilities [3]	Dec 1981
	TN20	Load Regulation [3]	Mar 1982
	TN21	RECORD [5]	May 1983
	TN22	MOVE [3]	May 1982
	TN23	The GIGI Graphics System [2]	May 1982
	TN24	G and H Floating Arithmetic [2]	Aug 1982
	TN25	Conversion from VMS 3.2 to 3.4 [2]	Jan 1984
	TN26	The H19 Editor (not yet available)	
!	TN27	VAX Manuals on Campus [1]	Jan 1984
	TN28	EDT and H19 Terminals [1]	Jun 1983
	TN29	KILL [4]	Aug 1983
	TN30	Beginning Fortran [9]	Oct 1983
	TN31	Beginning Pascal [9]	Oct 1983
	TN32	Intermediate Fortran [9]	Oct 1983
	TN33	Intermediate Pascal [9]	Oct 1983
	TN34	TAPECOPY [3]	Nov 1983
	TN35	RMF [2]	Oct 1983
	TN36	The DiskWriter [1]	Nov 1983

! TN37 KERMIT [10]

Feb 1984

COMPUTING INFORMATION CENTER DOCUMENTS

	Number	Title	Date	Location
	C5	Collected Algorithms of the ACM	Sep 1982	C/$40.00
	C15	CIC Brochure	1981	C/Free
! !	C16	Guidelines and Policies of the Computing Information Center [10]	Mar 1984*	W/C
	C17	Computerms [15]	Aug 1981	C/$1.00
	C20	Computing Resources for the Professional (CROP)	Bimonthly	C/$24.00/yr
	C22	Data Entry: A Selected Bibliography [10]	Sep 1983	C/$2.50
	C24	How Can Educators Become Computer Literates? [9]	Jan 1981	C
	C35	Computer Oriented Films and Video Tapes [12]	Jan 1984*	W
! !	C36	FORTH Programming Language: A Bibliography [12]	Mar 1984	W
	C37	Computer Users Guide to Identifying Research Support and Preparing Proposals [58]	Jan 1982	C/$7.00
	C40	Applications of Computers in the Legal Profession: A Selected Bibliography [26]	Jul 1982	C/$10.00
!	C50	Microcomputer User Groups [3]	Mar 1984	W/C
	C58	Guide to Nutritional Databases [14]	Aug 1982	C/$5.00
	C68	Publications Available from the Computing Information Center [2]	Jan 1982	C
	C70	Seattle Library Resources [18]	Aug 1981	C/$1.00
	C73	Periodical Holdings with Index	Jan 1984	C/$35.00
	C80	Information Sources to Aid in Selecting a Terminal [1]	Sep 1982	B
	C83	University Computer Center Newsletters [28]	Aug 1983	W/$2.00
	C165	CIRIX Users Guide [9]	Nov 1982	W/C
	A34	ACM Sig Publications (to become C1)	----	C

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