TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
FHWA/TX-83/ +421-1		

4. Title and Subtitle	5. Report Date
TRIDAQS Data Processing Programs-WYLBUR Commands and Operating Instructions	August, 1984
	6. Performing Organization Code

7. Author(s)	8. Performing Organization Report No.
Charles W. Blumentritt	Research Report 421-1

9. Performing Organization Name and Address	10. Work Unit No.
Texas Transportation Institute The Texas A&M University System College Station, Texas 77843	11. Contract or Grant No. Study 2-18-84-421
	13. Type of Report and Period Covered Interim - Sept. 1983 August 1984
12. Sponsoring Agency Name and Address Texas State Department of Highways and Public Transportation; Transportation Planning Division P.O. Box 5051 Austin, Texas 78763	14. Sponsoring Agency Code

15. Supplementary Notes

Research performed in cooperation with the U.S. Department of Transportation, Federal Highway Adminstration
Research Study Title: Developing a Freeway Data Base Model

16. Abstract

The B-2 TRIDAQS (Travel Information Data Acquisition System) is a unit for recording travel time information in a floating vehicle. The unit is highly portable, with easy transfer from vehicle-to-vehicle, and virtually independent of any special vehicle. The unit is operated by the driver, with the acquired data recorded on cassette tape. A playback arrangement within the unit permits recorded data to be transmitted directly to the computer for processing, utilizing an acoustic coupler and telephone hookup.

The battery of data processing programs (for processing the field data acquired by the TRIDAQS unit) is written in Fortran 77. The programs operate in a batch mode and inputs are supplied through the standard Fortran logical unit 5. In a terminal environment, the preparation of data cards in an 80 column format is difficult. This report describes a series of WYLBUR terminal programs that were written to interact with the user through a question/answer dialogue, and prepare the necessary data cards for a SYSIN file. At the end of the individual dialogue, the batch program execution is invoked. Sample program outputs are included in this report as a guide for program selection, and the error messages generated during batch execution are listed and discussed.

17. Key Words	18. Distribution Statement
Travel Time Studies, Portable Cassette Traffic Recorder	No restrictions. This document is available to the public through the National Technical Information Service, Springfield, Virginia 22161

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	43	

Form DOT F 1700.7 (8-69)

TRIDAQS DATA PROCESSING PROGRAMS - WYLBUR COMMANDS AND OPERATING INSTRUCTIONS

by

Charles W. Blumentritt

Research Report 421-1

Developing a Freeway Data Collection System

Research Study Number 2-18-84-421

Sponsored by the Texas
State Department of Highways and Public Transportation
In cooperation with the
U.S. Department of Transportation
Federal Highway Administration

Texas Transportation Institute
The Texas A&M University System
College Station, Texas

August 1984

ABSTRACT

Operation of the battery of Tridaqs (Travel Information Data Acquisition System) data processing programs is in a batch job environment with control cards. This paper describes the WYLBUR terminal program operation for controlling execution of the various programs in the battery, as well as the execution-time error messages and their meaning.

DISCLAIMER

The contents of this report reflect the views of the author who is responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

SUMMARY

The battery of data processing programs (for processing the field data acquired by the Tridaqs unit) is written in Fortran 77. The programs operate in a batch mode and inputs are supplied through the standard Fortran logical unit 5. In a terminal environment, the preparation of data cards in an 80 column format is difficult. This paper describes a series of WYLBUR terminal programs that were written to interact with the user through a question/answer dialogue, and prepare the necessary data cards for a SYSIN file. At the end of the individual dialogue, the batch program execution is invoked. The programs which control the interactive dialogue are a series of WYLBUR commands invoked through the EXECUTE file facility of WYLBUR.

Sample program outputs are repeated in this paper as a guide for program selection, and the error messages generated during batch execution are listed and discussed.

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I. INTRODUCTION

This summary paper discusses the operation of the Tridaqs data processing programs described in Chapter VI of the Travel Information Data Acquisition System (TRIDAQS) Users Manual - Revision 1. While the programs are individually described in that chapter, it is from the standpoint of a card-oriented, batch processing system. Invoking the operation of the programs in a terminal-oriented environment, however, may not be accomplished with the ease that is desirable. This is a situation that is not unique to this battery of programs. Preparing data for batch jobs requires the advance preparation of those data files which contain the parameters that control the execution of the batch jobs. In a non time-sharing environment, the programs generally require these parameters to be in specified columns of card image data. The battery of programs for processing Tridaqs data is written in FORTRAN 77. Each installation has its own convention for handling the setup of FORTRAN input data files, which in this case are for logical unit 5. It is easier to place data in specific fields within the 80 columns of data while on a keypunch, as opposed to a terminal. Some programs only input single data items on a card to alleviate this problem. The conventional FORTRAN solution is to use NAMELISTs in a terminal environment, which is a feature that does have some merit. The drawback is that the variable names have to be specified for each corresponding item of data, which can be a nuisance even when liberal use of default values are invoked.

When using these programs with the Texas A&M University

computer, they are invoked through the WYLBUR system, which provides a means for the user to enter and edit programs through the use of an interactive printing or display terminal connected to the computer. The counterpart system used by the Texas State Department of Highways and Public Transportation (SDHPT) is ROSCOE. The ROSCOE commands for interacting with the TRIDAQS data processing programs will not be written by TTI, but a series of WYLBUR commands have been implemented for use in processing TRIDAQS data through the Texas A&M computers. This document is written to assist as an example of how the ROSCOE commands could emulate a similar technique, and also as a guide for users who process the data through Texas A&M.

For further information on WYLBUR, the user is referred to the following references:

1. "Tutorial on Basic Wylbur Commands," February 1980, Texas A&M Data Processing Center, College Station, Texas.
2. "WYLBUR and Related Utilities," by Thomas Reid, August 1983, Texas A&M Data Processing Center, College Station, Texas.

The basic reference on the Tridaqs system is:

"Travel Information Data Acquisition System (TRIDAQS) Users Manual - Revision 1", by Charles W. Blumentritt, December 1983, Research Report 290-3, Texas Transportation Institute, Texas A&M University, College Station, Texas.

II. FIELD DATA TRANSMISSION

The initial step to be taken is to get the recorded data from the Tridaqs to a WYLBUR file. This is described in Chapter V, Section E of the users manual. Using the COLLECT UNNUMBERED feature of WYLBUR, the data is accumulated in the active file. It is the responsibility of the user to ensure that the active file is cleared prior to acquisition of new data, since the program that first processes these data will terminate upon encountering an indication of a soft end of file. Here, a soft end of file is defined as the coded information provided by the Tridaqs that indicates the end of a data set. While field tapes can be "stacked" for a later stage of processing, initially only one file of field data can be processed at a time. This will be explained in more detail in a later section.

To initiate a connection to the Texas A&M computer through WYLBUR, the Tridaqs in connected with the Teletype Model 43 in the configuration shown in Figure 1. When the Tridaqs is plugged in, its program performs an initialization sequence and the unit waits for a keyboard entry (from the Tridaqs keyboard) to signal the operating function to be performed (i.e., acquire field data, transmit data to SDHPT Austin, or transmit data to A&M College Station). In addition, data received by the acoustic coupler from the telephone link is routed through the Tridaqs to the teletype, and data entered through the teletype keyboard is routed through the Tridaqs to the acoustic coupler. Once the data transmission mode is selected through the Tridaqs keyboard,

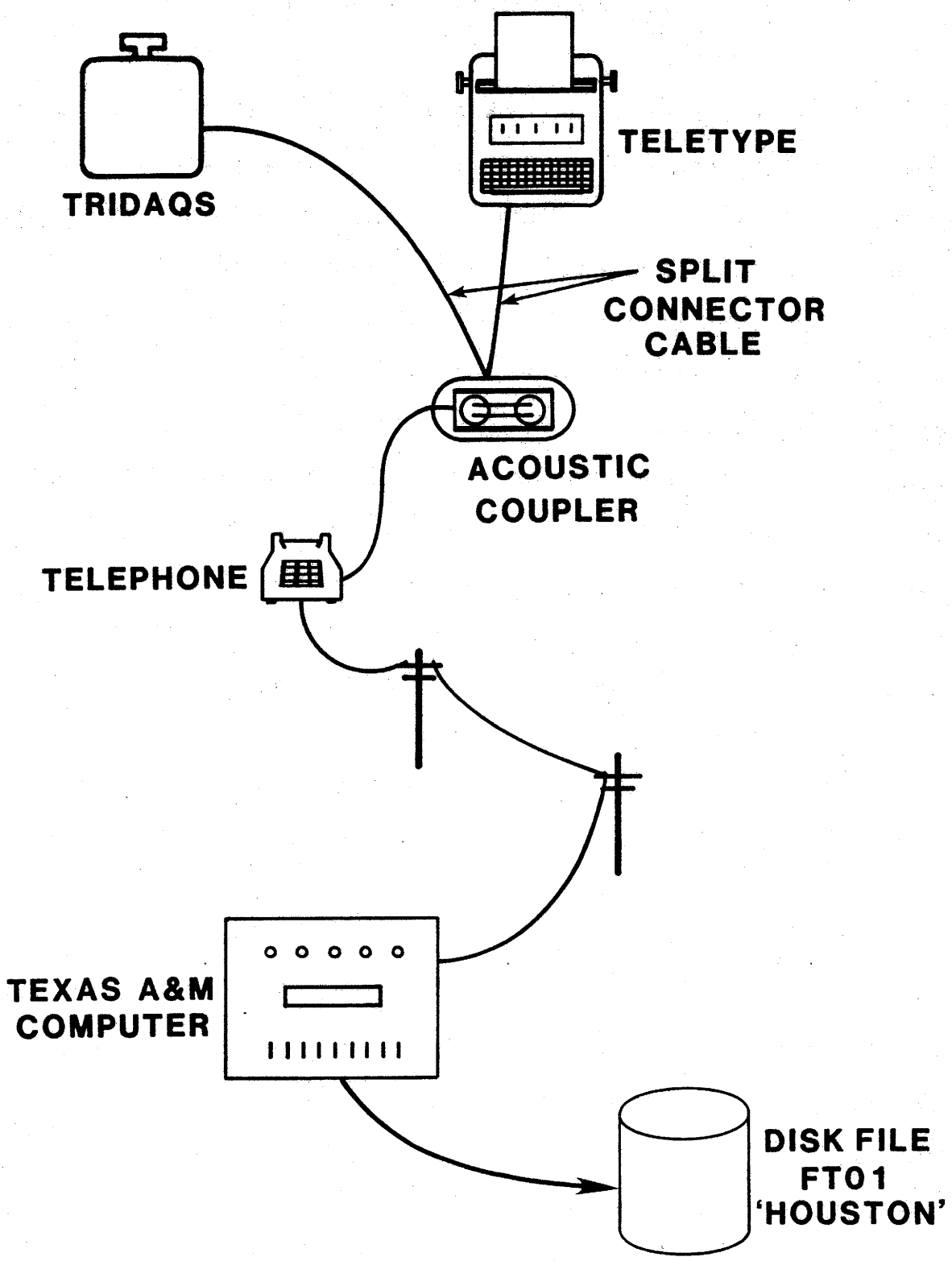

FIGURE 1. Equipment Configuration for WYLBUR 'COLLECT UNNUMBERED' Data Transfer

the teletype no longer functions and the Tridaqs communicates directly with the host computer according to established protocol. Data transmission to SDHPT is an automatic computer-to-computer transfer, and the teletype is not required in the loop. It is not necessary for the split connector cable to be plugged into the teletype when transmitting data to SDHPT from the Tridaqs.

The command sequence for readying the computer to receive Tridaqs data is as follows (note that the WYLBUR 'COMMAND?' prompt is omitted in the terminal dialogues given in this paper):

CLEAR ACTIVE

COLLECT UNNUMBERED

> At this point any button in the fourth column of the Tridaqs keyboard is pressed and the sequence described in Chapter V, Section E of the users manual is followed. The Tridaqs intercepts data from the acoustic coupler (prompts) and transmits in place of the teletype, which is temporarily disabled. At the end of the file transmission, the teletype is again enabled to allow sending of a break character to signal WYLBUR to issue a COMMAND? prompt.

SAVE filenamx

> Here, filenamx is a WYLBUR temporary file. At this point, another Tridaqs data tape may be inserted and the command sequence repeated above beginning with CLEAR ACTIVE. Each data file saved must have a unique name. Any number of files may be saved for later processing. The best operating procedure, however, is to immediately process a file after it is transmitted to A&M, so that it can be determined if errors occured during the telephone transmission. If errors are present, the Tridaqs tape file can be immediately retransmitted.

III. PREPROCESSING

The Tridaqs data preprocessor (program name: PREPROC) does not use any control parameters, and merely preprocesses the WYLBUR file 'HOUSTON'. This preprocessing stage consists of reformatting the data for later processing, and determining whether transmission errors occurred. If an error free transmission occurred (the procedure for testing this will be explained shortly), the data is appended to the file 'PREPIN' for later processing. If errors occurred during transmission, the data is not appended to 'PREPIN'. Detection of data transmission errors is accomplished by examining the output of the batch job error messages. The disk files used by PREPROC are shown in Figure 2.

The command sequence for the preprocessor is:

```
USE filnamx                 Δ*  Establish input data file
                            Δ   for preprocessor in "HOUSTON'
SAVE HOUSTON                Δ

EXEC FROM RUN#PREPROC       Δ   Execute the preprocessor

TRIDAQS DATA PREPROCESSING PROGRAM        Δ  Message from
Expects input data set from wylbur        Δ  preprocessor
  file 'HOUSTON'

FETCH TRIDAQS               Δ   Fetch the run's output

POINT'PREPROC'              Δ   List program output
                            Δ   to check status of studies
LIST NEXT/LAST              Δ   preprocessed

PURGE TRIDAQS               Δ   Scratch the output from this run
```

---

*The 'Δ' character denotes comments on the WYLBUR dialogue, and does not appear on the printout (or screen).

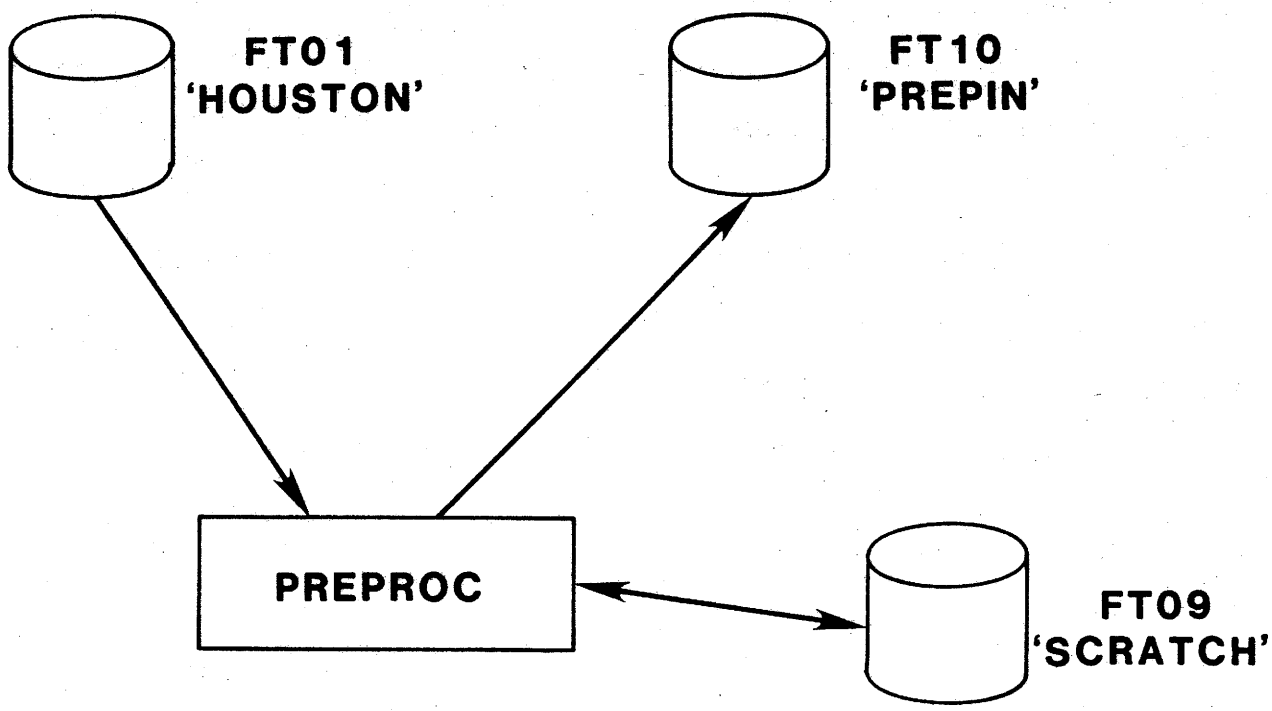

FIGURE 2. Preprocessor Program File Accession

The message that indicates successful preprocessing of a study and transfer of that study into a file for the next stage of processing is

STUDY X OK

where X is 1, 2, 3, ... Each study in a preprocessing run is assigned a serial number beginning with 1. Sample program output is shown in Figure 3.

See Chapter XII, section G for a discussion of error messages that can occur with the execution of PREPROC.

```
TRIDAQS DATA PREPROCESSOR 16:11:54 12/17/83
STUDY   1 OK
STUDY   2 OK
STUDY   3 OK
STUDY   4 OK
STUDY   5 OK
```

FIGURE 3. Program PREPROC Sample Output

IV. PROCESSING

The Tridaqs data processor (program name: PROCESS), like the preprocessor, does not use any control parameters. It routinely processes all the data in the intermediate file 'PREPIN' and transfers the raw study data to the master file 'RAWDATA'. The individual study summary statistics are printed out and also saved in the study summaries master file 'SUMDATA'. The disk files used by PROCESS are shown in Figure 4.

The command sequence for the processor is:

```
EXEC FROM RUN # PROCESS                  Δ Execute the processor

TRIDAQS BASIC DATA PROCESSING PROGRAM    Δ Message
Expects input data preprocessed by       Δ from
  program PREPROC                        Δ processor

FETCH TRIDAQS      Δ Fetch the run's output

POINT 'PROCESS'    Δ List the program output at this terminal.
                   Δ Alternately, or additionally, specify
LIST NEXT/LAST     Δ RELEASE TRIDAQS to list the output
                   Δ on the system printer.  Program
                   Δ output is 132 character records, in
                   Δ the format shown in Figure 5.

PURGE TRIDAQS      Δ Scratch the output from this run.
                   Δ Ignore if RELEASE was specified.
```

Since the study data has been preprocessed and is now under internal control, few processing errors may be expected to occur. See Chapter IX, section H for a discussion of error messages that can occur with the execution of PROCESS. Sample program output is shown in Figure 5.

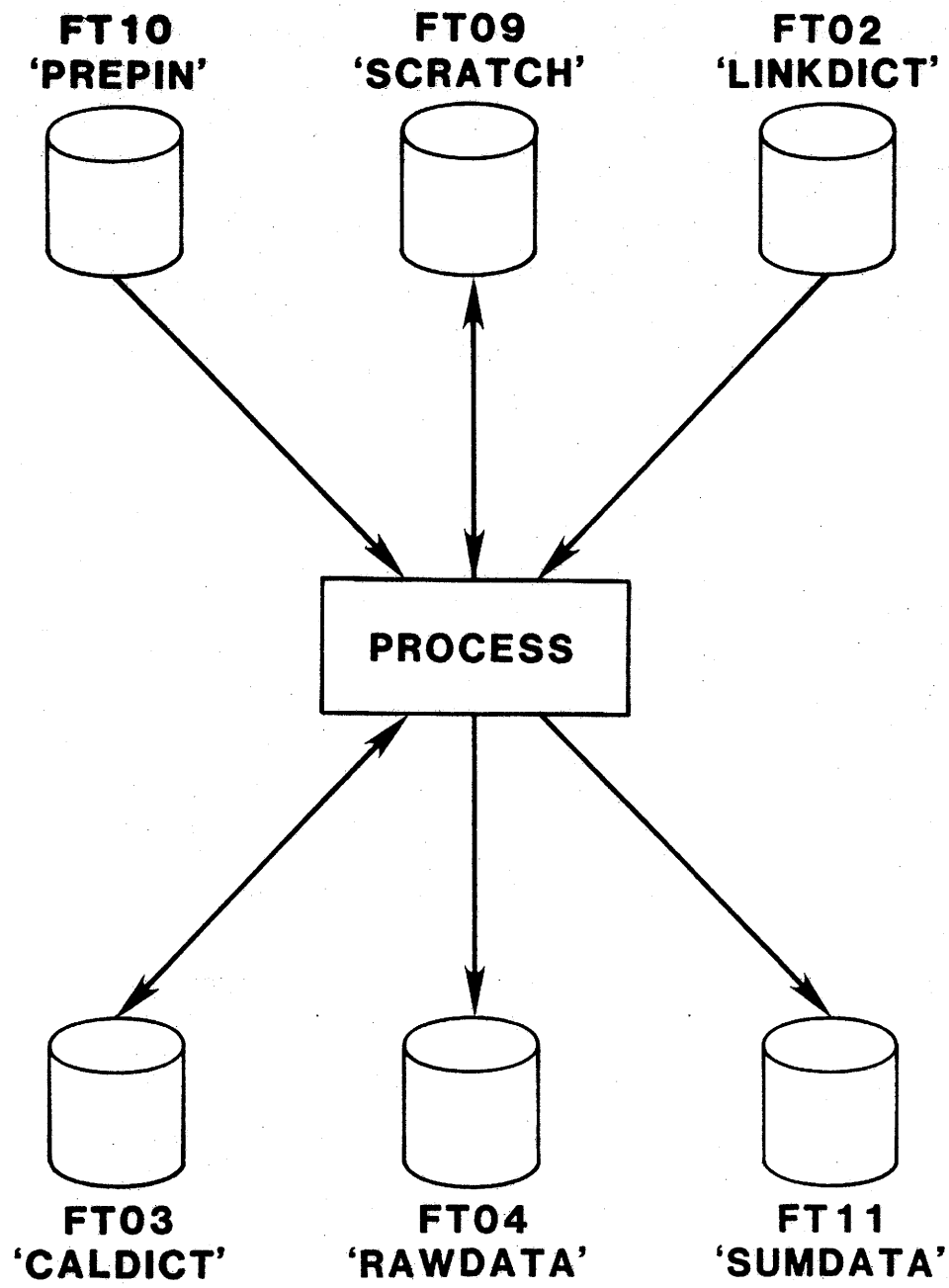

FIGURE 4. Processor Program File Accession

RESULTS FROM TOTAL STUDY LINK 45626

STUDY BEGAN 14:42: 4 11/22/83 PROCESSED 12/17/83 DRIVER 1 VEHICLE 366318 WEATHER DCST PAVEMENT DRY

DIST (FT)	TRVL TIME (MIN)	STOP TIME MIN	PCT STOP TIME	TRVL TIME /MI	AVG SPD MPH	VELOCITY (FT/SEC) MEAN	VELOCITY (FT/SEC) NOISE	ACCELERATION (FT/SEC/SEC) MEAN	ACCELERATION (FT/SEC/SEC) NOISE	MEAN VEL GRAD	GREEN-SHIELDS INDEX	NO. OF STOPS	STOPS PER MILE
271677	59.6	0.3	0	1.2	51.8	76.0	18.5	-0.00	1.06	0.014	960.56	2	0.0

**** SPEED DISTRIBUTION ****

SPEED	%MIN	%TIME
0	59.6	100.0
5	59.2	99.4
10	58.8	98.7
15	58.2	97.7
20	56.8	95.3
25	55.8	93.6
30	55.5	93.1
35	54.6	91.7
40	52.2	87.6
45	48.2	80.9
50	40.4	67.8
55	4.1	6.8
60	0.0	0.0
65	0.0	0.0
70	0.0	0.0
75	0.0	0.0

A TOTAL OF 20 PUSHBUTTON EVENTS WERE RECORDED FOR THIS STUDY AS FOLLOWS

TIME (SEC)	TIME (MIN)	DIST (FEET)	DIST (MILES)
9	0.1	630	0.1
21	0.3	1503	0.3
96	1.6	7309	1.4
157	2.6	11012	2.1
200	3.3	14152	2.7
222	3.7	15685	3.0
257	4.3	18156	3.4
292	4.9	20175	3.8
329	5.5	22407	4.2
355	5.9	24111	4.6
424	7.1	28270	5.4
463	7.7	31043	5.9
486	8.1	32954	6.2
542	9.0	37181	7.0
588	9.8	41007	7.8
621	10.3	43784	8.3
690	11.5	49428	9.4
722	12.0	52016	9.9
752	12.5	54348	10.3
791	13.2	57309	10.9

RESULTS BY SEGMENTS LINK 45626

DIST (FT)	TRVL TIME (MIN)	STOP TIME MIN	PCT STOP TIME	TRVL TIME /MI	AVG SPD MPH	VELOCITY (FT/SEC) MEAN	VELOCITY (FT/SEC) NOISE	ACCELERATION (FT/SEC/SEC) MEAN	ACCELERATION (FT/SEC/SEC) NOISE	MEAN VEL GRAD	GREEN-SHIELDS INDEX	NO. OF STOPS	STOPS PER MILE	CNTL	SECT	MILPNT	LANDMARK
														4632	1	00.0	US290 @ FM1960
26382	6.5	0.0	0	1.3	45.9	67.3	9.0	0.01	1.34	0.020	493.25	0	0.0				
														4632	1	5.0	US290 @ FM529
36906	7.9	0.0	0	1.1	53.0	77.7	8.0	0.06	0.95	0.012	766.44	0	0.0				
														4632	1	12.0	US290 @ BINGLE
14584	3.3	0.0	0	1.2	51.0	74.8	6.2	0.00	0.72	0.010	1155.56	0	0.0				
														4632	1	14.7	US290 @ ANTOINE
10576	2.3	0.0	0	1.1	53.4	78.3	4.0	-0.02	0.77	0.010	2088.53	0	0.0				
														4632	1	16.8	US290 @ IH610
9198	1.9	0.0	0	1.1	56.0	82.1	3.2	0.02	0.66	0.008	1968.04	0	0.0				
														4632	1	18.5	IH610 @ IH10

FIGURE 5. Program PROCESS Sample Output

V. POSTPROCESSING

The cummulative run statistics and plot program (program name: STATPLT) furnishes the statistics derived from a number of runs over a specified link, plus provides a printer plot of speed profiles. A substantial number of selection alternatives are available with this program, resulting in a nontrivial amount of data required for program operation. A liberal number of default options, however, serve to reduce the amount of data that has to be entered. The desired link number must be entered, but beyond that, many selection alternatives are available. The disk files used by STATPLT are shown in Figure 6.

The command sequence for the postprocessor is:

```
EXEC FROM RUN#PROCESS                    Δ initiate WYLBUR dialogue

SELECTED LINK & PLOT STATISTICS PROGRAM
Enter link number (1-999999), or END if finished
```

If the link number entered is less than 1 or greater than 999999, the same prompting message will be reissued. A similar action will be taken if an alphabetic sequence other than END is entered. Entering END will cause execution of STATPLT to be initiated.

```
DO YOU WANT TO PROCESS ALL STUDIES TO DATE FOR LINK X?
ENTER Y OR N
?
```

The link number entered in the previous step is repeated in this message as a verification. Type Y or N (upper case only) to respond. Any other character will cause the message to be reissued. Entering Y will cause any futher questions about subsets of studies relating to link X to be bypassed, and the next prompt will be in regard to plotting. Entering N will cause further prompts to determine which subset of studies over link X are to be processed. All the prompts immediately following, up to the point where plot information is requested, will be issued after an N response above.

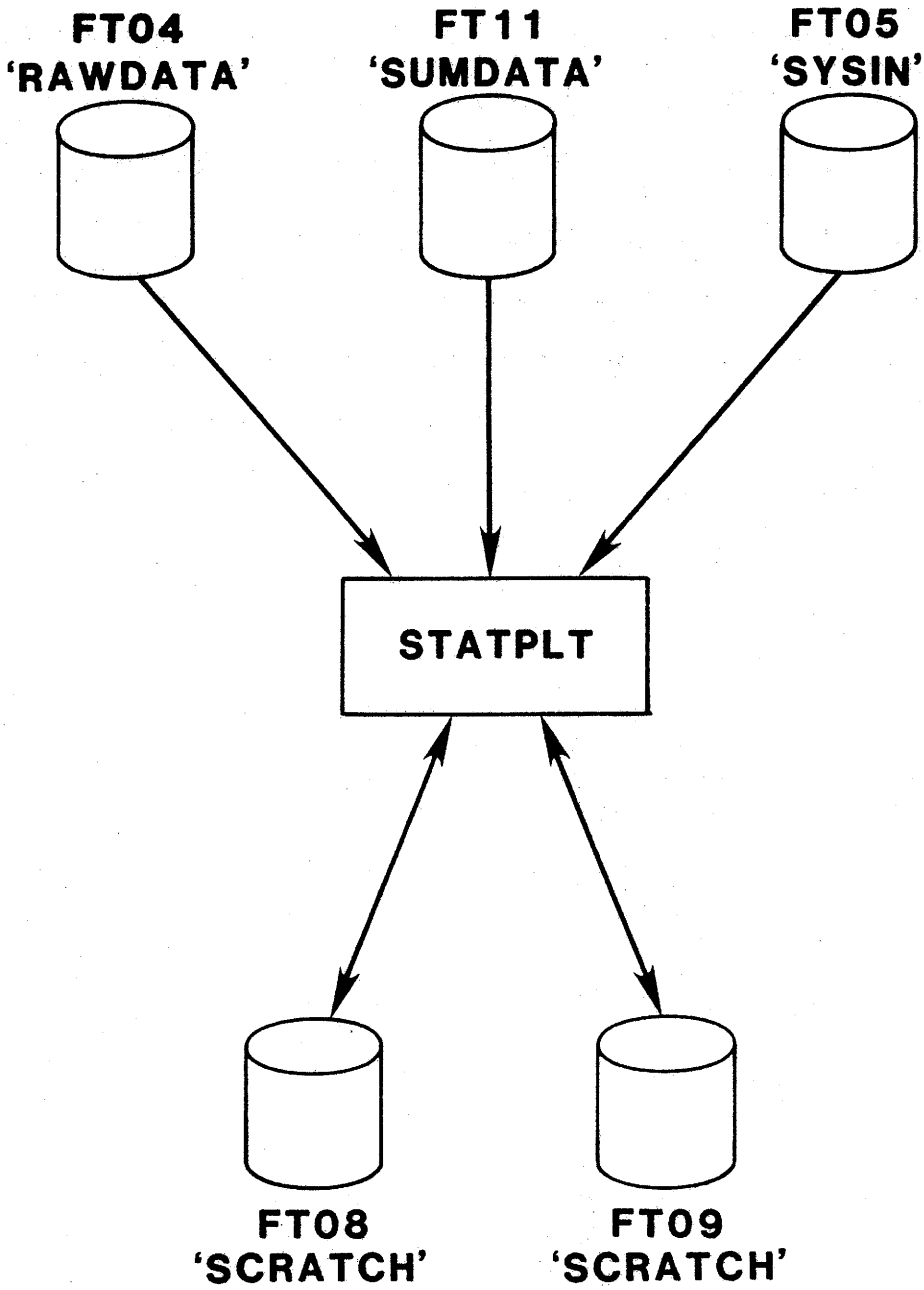

FIGURE 6. Postprocessor Program File Accession

```
BEGINNING DATE OF STUDIES TO PROCESS
Enter month, or cr for all
?
```

Enter 1-12, or return to consider all beginning dates and proceed directly to ending date specification.

```
Enter day
?
```

Enter 1-31 (no check is made for the number of days in the month previously entered).

```
Enter last 2 digits of year
?
```

Enter 84-88.

```
ENDING DATE OF STUDIES TO PROCESS
Enter month, or cr for all
?
```

Enter 1-12, or return to consider all of ending dates and proceed directly to beginning time specification.

```
Enter day
?
```

Enter 1-31 (no check is made for the number of days in the month previously entered).

```
Enter last 2 digits of year
?
```

Enter 84-88.

```
BEGINNING TIME OF DAY OF STUDIES TO PROCESS
Enter hour (0-23), or cr for all
?
```

Enter 0-23, or return to consider all beginning times and proceed directly to ending time specification.

```
Enter minute (0-59)
?
```

Enter 0-59. A simple return is not equivalent to 0.

```
ENDING TIME OF DAY OF STUDIES TO PROCESS
Enter hour (0-23), or cr for all
?
```

Enter 0-23, or return to consider all ending times and proceed directly to driver number specification.

```
Enter minute (0-59)
?
```

Enter 0-59. A simple return is not equivalent to 0.

```
DRIVER NUMBER FOR STUDIES TO PROCESS
Enter 1-999999, or cr for all
?
```

Enter 1-999999 to select studies conducted only by a specific driver number, or return to consider all drivers and proceed to vehicle number specification.

```
VEHICLE NUMBER FOR STUDIES TO PROCESS
Enter 1-999999, or cr for all
?
```

Enter 1-999999 to select studies conducted only by a specific vehicle, or return to consider all vehicles and proceed to weather code specification.

```
WEATHER CODE FOR STUDIES TO PROCESS
1 Clear
2 Partly Cloudy
3 Cloudy
4 Rain
5 Sleet
6 Fog
7 Dust
8 Snow
cr for all
?
```

Enter 1-8 to select studies conducted only during specific weather conditions, or return to consider all weather conditions and proceed to pavement code specification.

```
PAVEMENT CODE FOR STUDIES TO PROCESS
1 Dry
2 Damp
3 Wet
4 Ice
5 Snow
cr for all
?
```

Enter 1-5 to select studies conducted only during specific pavement conditions, or return to consider all pavement conditions and proceed to plot indicator specification.

```
Is speed profile plot desired? Y or N
?
```

Type Y or N according to whether or not a speed profile printer plot is desired for the studies designated above.

```
Is event plot desired? Y or N
?
```

Type Y or N according to whether or not an event plot is desired for the studies designated above. An event plot is a printer plot that prints only those points on the speed profile where an event button was pressed. Note that either a speed profile plot or an event plot may be selected, but not both.

```
PLOT INTERVAL (1-999) IN FEET
cr for default 132 feet
?
```

This message only appears if either of the plot options has been specified. Enter 1-999 to specify a plot interval in feet, or return to select the default value of 132 feet (0.025 mile). Be aware that Tridaqs data is collected at one second intervals, and a plot interval less than the one second distance traveled by the vehicle will cause repetitious plot points to be generated.

At this point, the parameter designation process is complete, and the statistics and plot program is executed. The remainder of the commands to list the output of the run are:

```
FETCH TRIDAQS       Δ Fetch the run's output

POINT 'STATPLT'     Δ List the program output at this
                    Δ terminal. Alternately, or
LIST NEXT/LAST      Δ additionally, specify RELEASE
                    Δ TRIDAQS to list the output on the
                    Δ system printer. If long plots have
                    Δ been generated, the use of the system
                    Δ printer is recommended. Program
                    Δ output is 132 character records, in
                    Δ the format shown in Figures 7, 8, 9,
                    Δ and 10.

PURGE TRIDAQS       Δ Scratch the output from this run.
                    Δ Ignore if RELEASE was specified.
```

See Chapter IX, section I for a discussion of error messages that can occur with the execution of STATPLT. Sample program outputs are shown in Figures 7, 8, 9 and 10.

BEGIN DATE **/**/** END DATE **/**/** BEGIN TIME **** END TIME **** DRIVER **** VEHICLE **** WEATHER **** PAVEMENT ****
(ASTERISKS ABOVE DENOTE ITEM WAS UNSPECIFIED)

DATE	TIME	DISTANCE (MILES)	TRAVEL TIME MIN	PERCENT STOP TM	TRAVEL TIME/MIL	AVERAGE SPED MPH	MEAN VEL GRADIENT	GREENSHLD INDEX	STOPS /MILE	VEH DIST DSRP(FT)
12/ 9/83	654	10.20	14.98	9.00	1.47	40.84	0.03	292.92	0.88	53844.00
12/ 9/83	730	10.76	14.58	10.00	1.35	44.28	0.02	439.04	0.37	56820.00
12/ 9/83	1144	11.23	13.15	6.00	1.17	51.22	0.02	806.83	0.27	59276.00
12/ 9/83	1219	10.76	12.55	7.00	1.15	51.45	0.02	945.91	0.19	56825.00

LINK 290107 SUMMARY STATISTICS 12/17/83

BEGIN DATE **/**/** END DATE **/**/** BEGIN TIME **** END TIME **** DRIVER **** VEHICLE **** WEATHER **** PAVEMENT ****
(ASTERISKS ABOVE DENOTE ITEM WAS UNSPECIFIED)

NUMBER OF OBSERVATIONS = 4

	DISTANCE (MILES)	TRAVEL TIME MIN	PERCENT STOP TM	TRAVEL TIME/MIL	AVERAGE SPED MPH	MEAN VEL GRADIENT	GREENSHLD INDEX	STOPS /MILE	VEH DIST DSRP(FT)
SUM	42.95	55.27	32.00	5.13	187.79	0.10	2484.70	1.71	*********
MEAN	10.74	13.82	8.00	1.28	46.95	0.02	621.18	0.43	56691.25
ST DEV	0.42	1.15	1.83	0.15	5.26	0.00	305.97	0.31	2222.25
MIN	10.20	12.55	6.00	1.15	40.84	0.02	292.92	0.19	53844.00
MAX	11.23	14.98	10.00	1.47	51.45	0.03	945.91	0.88	59276.00
COFVAR	0.04	0.08	0.23	0.12	0.11	0.16	0.49	0.73	0.04

FIGURE 7. Program STATPLT Sample Output

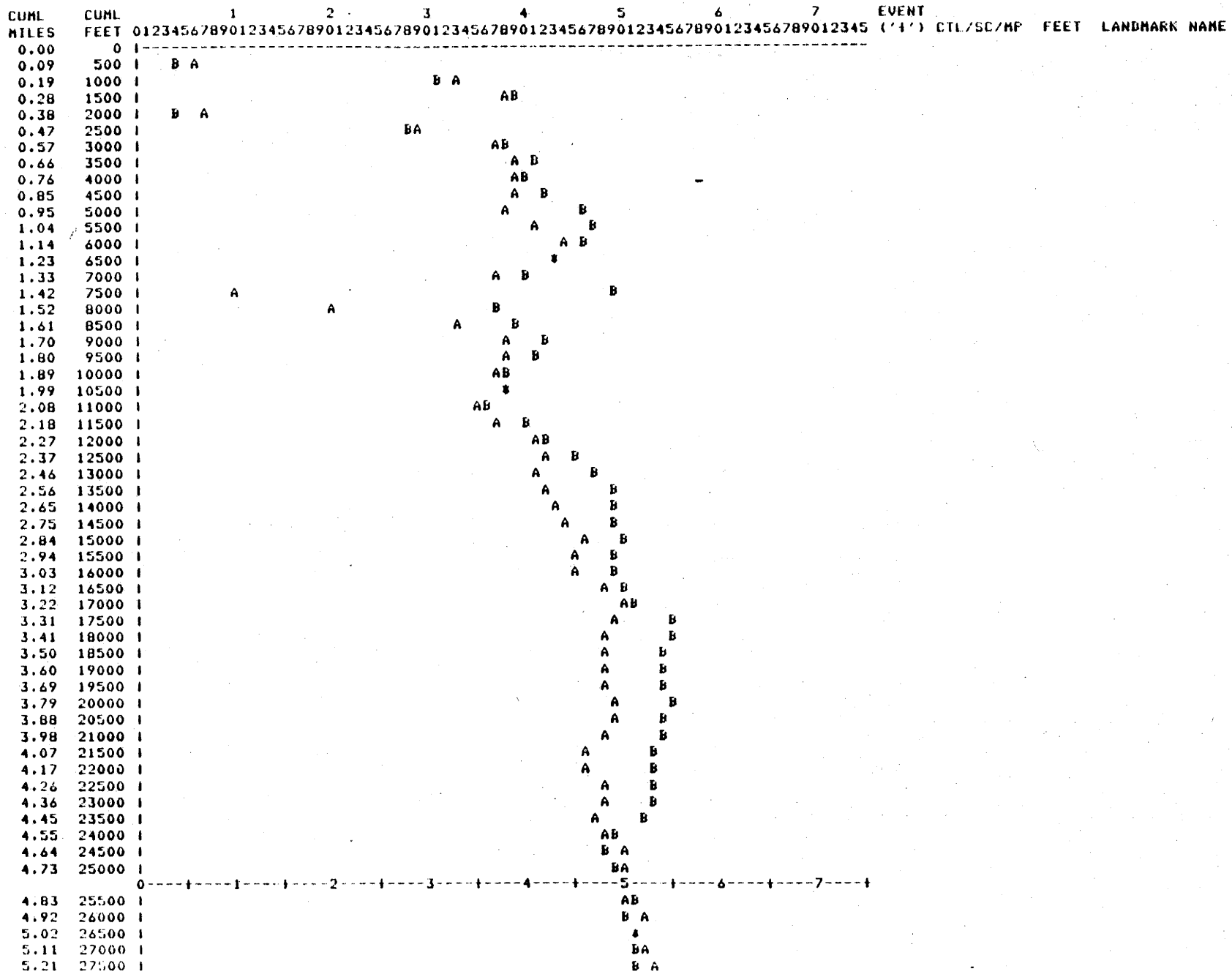

FIGURE 8. Multiple Study Speed Profile Sample Output

BEGIN DATE 12/ 9/83 END DATE **/**/** BEGIN TIME 1200 END TIME **** DRIVER **** VEHICLE **** WEATHER **** PAVEMENT ****
(ASTERISKS ABOVE DENOTE ITEM WAS UNSPECIFIED)

DATE	TIME	DISTANCE (MILES)	TRAVEL TIME MIN	PERCENT STOP TM	TRAVEL TIME/MIL	AVERAGE SPED MPH	MEAN VEL GRADIENT	GREENSHLD INDEX	STOPS /MILE	VEH DIST DSRP(FT)
12/ 9/83	1219	10.76	12.55	7.00	1.15	51.45	0.02	945.91	0.19	56825.00

SPEED PROFILE PLOT FOR LINK 290107

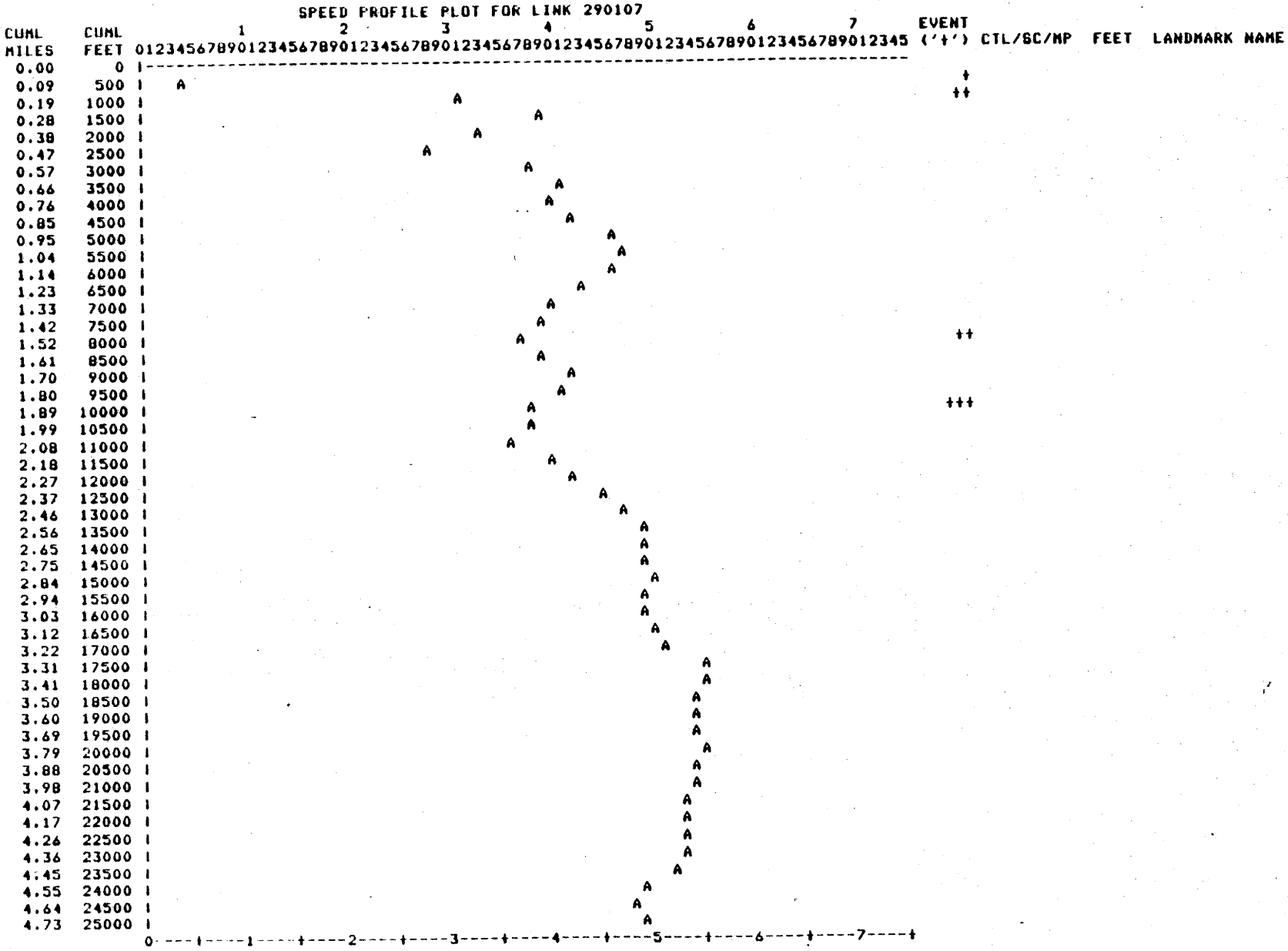

FIGURE 9. Single Study Speed Profile Sample Output

```
                                LINK    290107 SUMMARY STATISTICS          12/17/83
BEGIN DATE **/**/**  END DATE **/**/**  BEGIN TIME 1100  END TIME 1200  DRIVER ****  VEHICLE ****  WEATHER ****  PAVEMENT ****
(ASTERISKS ABOVE DENOTE ITEM WAS UNSPECIFIED)

                 DISTANCE    TRAVEL    PERCENT     TRAVEL     AVERAGE    MEAN VEL GREENSHLD      STOPS  VEH DIST
  DATE    TIME   (MILES)   TIME MIN   STOP TM    TIME/MIL   SPED MPH    GRADIENT    INDEX       /MILE  DSRF(FT)
12/ 9/83 1144    11.23      13.15       6.00       1.17      51.22        0.02      806.83       0.27  59276.00

                                EVENT PLOT FOR LINK 290107

CUML     CUML          1         2         3         4         5         6         7      EVENT
MILES    FEET 01234567890123456789012345678901234567890123456789012345678901234567890123456 (*1*) CTL/SC/HP  FEET  LANDMARK NAME
 0.00       0 |-------------------------------------------------------------------------------
 0.05     264 |                   A                                                        1
 0.07     396 |                  A                                                         1
 1.42    7524 | A                                                                          1
 2.05   10824 |                             A                                              1
 8.40   44352 |                                       A                                    1
 8.42   44484 |                                       A                                    1
```

FIGURE 10. Event Plot Sample Output

VI. LINK DICTIONARY ADDITIONS

The Tridaqs link dictionary update program (program name:LINKUP) provides the function of making additions to the link dictionary file (LINKDICT). The link dictionary furnishes link distance, facility name, milepost at beginning of link, and landmark at end of link, to the processor and plot programs. The link dictionary records are each 22 bytes long, and the user may keep as large a dictionary on line as practical. A separate program provides a link deletion feature to remove unused links from the file to keep it a manageable size. The disk files used by LINKDICT are shown in Figure 11.

The command sequence for the link dictionary update program is:

```
EXEC FROM RUN#LINKUP              Δ initiate WYLBUR dialogue

PROGRAM TO ADD LINKS TO LINK DICTIONARY      Δ messages from
Enter link number(1-999999), or cr to        Δ link dictionary
  continue same link, or END to execute      Δ update program
?
```

Enter link number to begin definition of new link, return to continue definition of link, or END to initiate execution of link dictionary update program.

```
NEW LINK X BEGINNING
Enter control number (1-9999), or cr to ignore
  control, section, milepoint
?
```

A new link is being defined, and X is repeated for verification. Enter the control number of the control, section, & milepoint (CSMP) designation for the beginning of the link. If CSMP is not needed, enter a simple return.

```
Enter section number (1-99)
?
```

A control number was entered; enter section number 1-99.

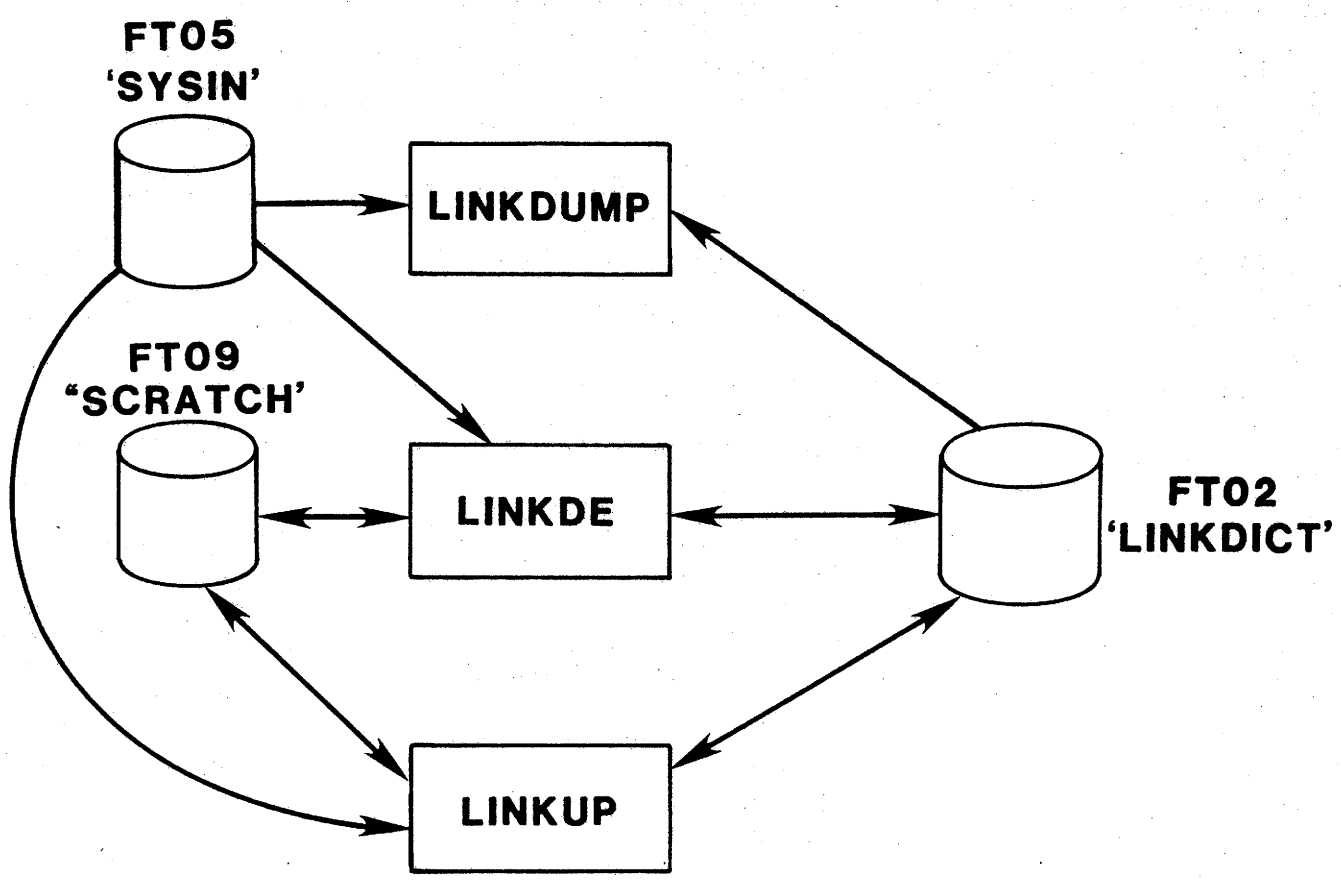

FIGURE 11. Link Dictionary Maintenance Programs File Accession

Enter milepoint (0-999)
?

Enter milepoint designation in tenths of miles 0-999.

Enter landmark distance in feet (100-999999)
?

This message appears only during the continuation phase of the link definition. Enter the distance to the landmark in feet 100-999999. Sublink definitions less than 100 feet are not permitted.

Enter name of landmark (30 character maximum)
?

Enter the name of the landmark, up to 30 characters. If 30 characters are exceeded, the above message will be reissued.

CONTINUATION CARD LIMIT OF 99 EXCEEDED

A link may consist of a maximum of 100 sublinks. If this limit is exceeded, the above message is issued.

See Chapter IX, section F for a discussion of error messages that can occur with the execution of LINKUP.

VII. LINK DICTIONARY DELETIONS

The Tridaqs link dictionary deletion program (program name: LINKDE) deletes a specified link from the link dictionary. The disk files used by LINKDE are shown in Figure 11.

The command sequence for the link dictionary deletion program is:

```
EXEC FROM RUN#LINKDE      Δ initiate WYLBUR dialogue

PROGRAM TO DELETE LINKS FROM LINK DICTIONARY      Δ messages
Enter link number (1-999999), or END to execute   Δ from link
?                                                 Δ dictionary
                                                  Δ deletion
                                                  Δ program
```

Enter number of link to delete, or END to initiate execution of link dictionary deletion program.

See Chapter IX, section D for a discussion of error messages that can occur with the execution of LINKDE.

VIII. LINK DICTIONARY DUMP

The Tridaqs link dictionary dump program (program name: LINKDUMP) dumps the contents of the link dictionary in the format shown in Figure 12. No operating parameters or link numbers are required for execution of the program, since the entire dictionary is dumped. The disk files used by LINKDUMP are shown in Figure 11.

The command sequence for the link dictionary dump program is:

```
EXEC FROM RUN#LINKDUMP                  Δ initiate WYLBUR dialogue

PROGRAM TO DUMP ENTIRE LINK             Δ message from link
  DICTIONARY FILE                       Δ dictionary dump
                                        Δ program
```

See Chapter IX, section E for a discussion of error messages that can occur with the execution of LINKDUMP.

LINK	CONTROL	SECTION	MILEPOINT	FEET	LANDMARK
45626	4632	1	1	0	US290 @ FM1960
45626	0	0	0	26400	US290 @ FM529
45626	0	0	0	36960	US290 @ BINGLE
45626	0	0	0	14520	US290 @ ANTOINE
45626	0	0	0	10560	US290 @ IH610
45626	0	0	0	7240	IH610 @ IH10
45626	0	0	0	9900	IH610@WASHINGTN
45626	0	0	0	25740	IH610 @ IH45
45626	0	0	0	6600	IH45@WASHINGTON
45626	0	0	0	1320	IH45@MEMORIAL
45626	0	0	0	1848	IH45@ALLEN PKY
45626	0	0	0	6072	IH45 @ MAIN
45626	0	0	0	7128	IH45 @ US59
45626	0	0	0	15840	IH45@M.L.KING
45626	0	0	0	7392	IH45@WAYSIDE
45626	0	0	0	14520	IH45 @ IH610
45626	0	0	0	5808	IH45@BROADWAY
45626	0	0	0	18480	IH45@ ARPT BLVD
45626	0	0	0	8712	IH45 @EDGEBROOK
45626	0	0	0	7128	IH45 @ SHAVER
45626	0	0	0	18744	IH45 @ FM353
45626	0	0	0	6072	IH45 @ FM1959
45626	0	0	0	16104	IH45 @ FM 2351
45626	0	0	0	12672	IH45@NASA RD 1
45626	0	0	0	6600	IH45 @ FM528
45626	0	0	0	13728	IH45 @ FM518
45626	0	0	0	16104	IH45 @ FM646
45626	0	0	0	11880	IH45 @ FM517

FIGURE 12. LINKDUMP Sample Output

IX. SUMMARY STATISTICS FILE DUMP

The Tridaqs summary statistics file dump program (program name:DUMPSUMM) dumps the contents of the summary statistics file in the format shown in Figure 13. No operating parameters or link numbers are required for execution of the program, since the entire summary statistics file is dumped. This program is used primarily for debugging purposes, and would seldom be used for general purposes. The disk files used by dumpsumm are shown in Figure 14.

The command sequence for the summary statistics file dump program is:

```
EXEC FROM RUN#DUMPSUMM                  Δ initiate WYLBUR dialogue

PROGRAM TO DUMP ENTIRE TRIDAQS          Δ initial message
  SUMMARY STATISTICS FILE               Δ from WYLBUR
                                        Δ EXECUTE program
```

See Chapter IX, section B for a discussion of error messages that can occur with the execution of DUMPSUMM.

```
290122   726    1    12    9   83    6    34    36    1 366318   1    1     0.88   0.0
 28261   12.10       5.65  47  135   26.54  38.93   40.21   0.07      3.10  0.08   742.70    2
   0.37     0        0     0
290107   899    1    12    9   83    6    54     7    1 366318   1    1     0.88   0.0
 53844   14.98       1.37   9   88   40.84  59.89   35.72   0.06      1.79  0.03   292.72    7
   0.88     0        0     0
290501   669    1    12    9   83    7    17    46    1 366318   1    1     0.88   0.0
 49599   11.15       0.27   2   71   50.55  74.14   17.79   0.03      1.62  0.02   850.26    1
   0.11     0        0     0
290107   875    1    12    9   83    7    30    29    1 366318   1    1     0.88   0.0
 56820   14.56       1.42  10   81   44.28  64.94   25.69   0.07      1.40  0.02   439.04    4
   0.37     0        0     0
290501   723    1    12    9   83    7    48    23    1 366318   1    1     0.88   0.0
 55776   12.05       0.48   4   68   52.60  77.15   20.46   0.00      1.87  0.02   776.43    1
   0.09     0        0     0
905107   739    1    12    9   83    8     3    42    1 366318   1    1     0.88   0.0
 56541   12.32       0.08   1   69   52.17  76.51   18.12   0.06      1.28  0.02  1057.97    1
   0.09     0        0     0
290501   714    1    12    9   83   11    26    18    1 366318   1    1     0.88   0.0
 56178   11.90       0.28   2   67   53.65  78.68   19.30   0.04      1.35  0.02   930.58    2
   0.19     0        0     0
290107   789    1    12    9   83   11    44    46    1 366318   1    1     0.88   0.0
 59276   13.15       0.77   6   70   51.22  75.13   24.91   0.07      1.66  0.02   806.83    3
   0.27     0        0     0
290501   190    1    12    9   83   12     2    10    1 366318   1    1     0.88   0.0
 16587    3.17       0.0    0   60   59.52  87.30    5.70   0.21      2.59  0.03  1416.78    0
   0.0      0        0     0
290507   597    1    12    9   83   12     7    14    1 366318   1    1     0.88   0.0
 36486    9.95       0.63   6   86   41.67  61.12   25.52   0.07      1.41  0.02   447.67    2
   0.29     0        0     0
290107   753    1    12    9   83   12    19    51    1 366318   1    1     0.88   0.0
 56825   12.55       0.93   7   69   51.45  75.46   25.77   0.06      1.78  0.02   745.91    2
   0.19     0        0     0
290501   145    1    12    9   83   12    37    13    1 366318   1    1     0.88   0.0
  9685    2.42       0.07   3   79   45.54  66.79   24.56   0.08      2.11  0.03   221.34    1
   0.55     0        0     0
```

FIGURE 13. DUMPSUMM Sample Output

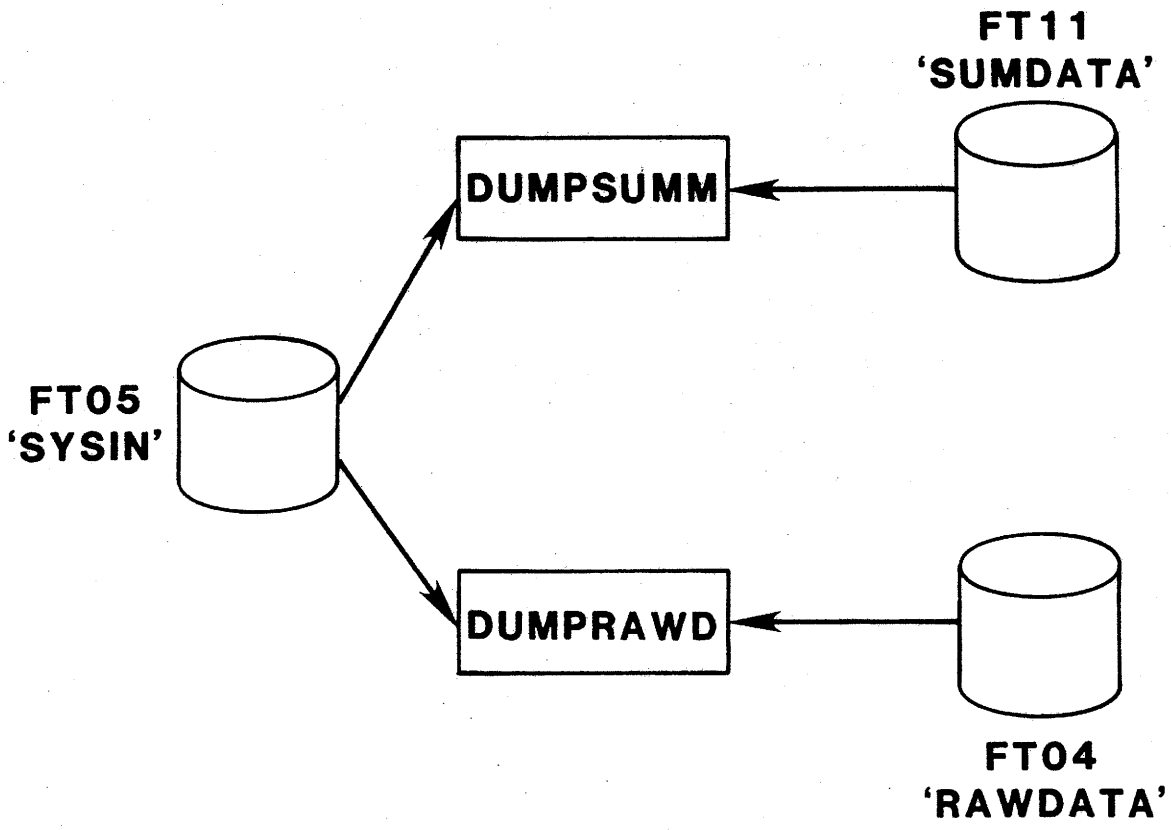

FIGURE 14. Master Data File Dump Programs File Accession

X. FIELD RAW DATA FILE DUMP

The Tridaqs raw data file dump program (program name: DUMPRAWD) dumps the raw data for all studies conducted on a specified link. The dump format is shown in Figure 15. The desired link number is specified in the WYLBUR dialogue. This program is used primarily for debugging purposes. The disk files used by DUMPRAWD are shown in Figure 14.

The command sequence for the raw data dump program is:

```
EXEC FROM RUN#DUMPRAWD                    Δ initiate WYLBUR dialogue

PROGRAM TO DUMP ORIGINAL DATA FOR SELECTED LINKS
Enter link number (1-999999)
?
```

Enter number of link to be dumped.

```
Enter next link number, or END to execute
?
```

Enter next link to be dumped, or END to initiate execution of raw data dump program.

See Chapter IX, section A for a discussion of error messages that can occur with the execution of DUMPRAWD.

FIGURE 15. DUMPRAWD Sample Output

XI. FILE INITIALIZATION

The file initialization program (program name: FILEIN) provides the means for initializing a file. This is accomplished by rewinding the file and immediately writing an end of file mark. Naturally, this destroys the contents of the file, and the program should be used with extreme caution to avoid the inadvertent destruction of a data file.

Program input is a set of file number to be initialized, corresponding to the Fortran logical unit numbers. The file numbers currently assigned to Tridaqs data processing functions are:

File #	File Name	File Content
1	HOUSTON	Field Raw Data File
2	LINKDICT	Link Dictionary
3	CALDICT	Calibration Dictionary
4	RAWDATA	Raw Data Master File
5	SYSIN	System Input
6	SYSOUT	System Output
7		Unused
8		Scratch File(used for printer plot)
9		Scratch File
10	PREPIN	Preprocessed Studies File
11	SUMDATA	Study Summaries Master File
12		Experimental System Output

The command sequence for the file initialization program is:

```
EXEC FROM RUN#FILEIN                    Δ initiate WYLBUR dialogue

PROGRAM TO PLACE AN EOF AT BEGINNING OF SPECIFIED FILES
CAUTION!! THIS PROGRAM DESTROYS DATA SETS!!
Enter file number (1-12)
?
```

Enter desired file number.

```
Enter next file number, or END to execute
```

Enter additional file number, or END to initiate execution of FILEIN. The above message is repeated until END is entered.

See Chapter IX, section C for a discussion of error messages that can occur with the execution of FILEIN.

XII. ERROR MESSAGES

The error messages previously mentioned are issued from the WYLBUR execute programs that provide the interactive dialogue with the user. The last statements in each of these execute programs set up the JCL for batch execution of the appropriate program. This section will enumerate the error messages that may be issued when the designated batch program finally executes, should an error condition be detected. These error messages will appear in the regular program output, which can appear at the terminal by using the WYLBUR FETCH and LIST options, or is printed out when the job output is routed to the offline printer by invoking the WYLBUR RELEASE option. The error messages are categorized below according to the issueing program.

A. DUMPRAWD Error Messages

MISSING END OF RECORD INDICATOR - DATA ERROR

A hard end of file indicator was sensed while reading from the raw data master file. This is an irrecoverable error, and indicates that the raw data was improperly formatted when it was tranferred into the master file.

B. DUMPSUMM Error Messages

No error messages are issued from this program.

C. FILEIN Error Messages

No error messages are issued from this program.

D. LINKDE Error Messages

LINK X NOT FOUND IN DICTIONARY

Link X, specified for deletion, is not defined in the dictionary.

E. LINKDUMP Error Messages

No error messages are issued from this program.

F. LINKUP Error Messages

CONTROL SECTION REDEFINED FOR LINK X AT Y FEET

The control and/or section number changed from one sublink to the next. This may not be an error for the link, but is highlighted for verification. If it is an error, the link should be deleted and redefined correctly.

INSUFFICIENT DATA OR NONZERO FEET SPECIFIED FOR LINK X

The first card of the series defining a link has a zero link, control, section, or milepoint specified, or else has a nonzero distance. The data record in question is printed immediately after the above message, the record is ignored, and further processing is terminated. All links specified prior to this record were entered in the dictionary. Correct the input data and rerun the program.

UNSPECIFIED DISTANCE OR DISTANCE INCREMENT TOO SMALL FOR LINK X

The distance specified on a sublink card is less than 100 feet. The data record in question is printed immediately after the above message, the record is ignored, and further processing is terminated. All links specified prior to this record were entered in the dictionary. Correct the input data and rerun the program.

INCOMPLETE CONTROL/SECTION/MILEPOINT RESPECIFICATION FOR LINK X

On the sublink card, the control or section or milepoint was nonzero, indicating CSMP respecification, but the control or section was zero. This is insufficient data for a respecification. The data record in question is printed immediately after the above message, the record is ignored, and further processing is terminated. All links specified prior to this record were entered in the dictionary. Correct the input data and rerun the program.

G. PREPROC Error Messages

EOR IDENTIFIER ERROR FOR STUDY X

The end of record identified for study X (X=1,2,3,... for the studies in this file) is in error, probably resulting from either field recording error or a data transmission error. The study is accepted, but may be in error. A checksum error will usually be issued, in addition. The field data file should be retransmitted for verification. If the same error occurs twice, the study should be ignored.

INVALID CHECKSUM FOR STUDY X OF THIS DATA SET/RECORDED = Y, CALCULATED = Z

A checksum error has been detected for study X, probably due to a data transmission error. The transmitted checksum is Y, and the calculated checksum is Z. The entire study is printed out in hexadecimal immediately following the above message. The study is ignored. The field data file should be retransmitted for verification. If the same error occurs twice, noting the checksum values, the study should be ignored. If the checksum values change, further retransmission is suggested.

UNEXPECTED EOF ENCOUNTERED DURING PROCESSING OF STUDY X
THIS STUDY IGNORED AND PROCESSING TERMINATED

A system end of file was sensed while reading data from the raw data input file. Since a Tridaqs end of file is normally transmitted and signals end of data, an abnormal situation has occurred. The error could have originated in the field if the END TAPE button was not pressed to end the file. Alternately, a data transmission error may have occurred. A retransmission of the data should clarify which of these errors has occurred. Subsequent studies will not be processed until this error is cleared.

UNEXPECTED SOFT EOF ENCOUNTERED WHILE PROCESSING STUDY X
THIS STUDY IS DELETED AND PROCESSING TERMINATED

The Tridaqs end of tape indicator was encountered at an unexpected point during processing. An end of record indicator is missing for study X. Either a field recording error or data transmission error has occurred. Retransmit the data to attempt clearing of the error. Subsequent studies will not be processed until this error is cleared.

NON-HEX CHARACTER ENCOUNTERED X Y

A character out of the 0-F hexadecimal range has been encountered. X is the Fortran format A-conversion of the character, and Y is the Fortran format I-conversion of the 2 byte integer variable containing the character. (The offending character is in the left byte, and a blank is in the right byte of the halfword.) A data transmission error has probably occurred. Retransmit the data to attempt clearing of the error.

HEX CONVERSION ERROR: EXPECTING 0-15, GOT X

In converting a numeric quantity to its hexadecimal representation for printout, a value greater than 15 has been encountered. Generally, this is a companion message

to the non-hex-character-encountered message previously described. Similarly, a retransmission of the data should be attempted.

ASCII REVERSION ERROR: EXPECTING 0-15, GOT X

In converting a numeric quantity to its ASCII equivalent for checksum calculation, a value X, greater than 15, was encountered. Probably, a data transmission error has occurred. A checksum error will likely be issued, in addition. Retransmit the data to attempt clearing this error. The study should be rejected if the error cannot be cleared.

H. PROCESS Error Messages

UNEXPECTED HARD EOF ENCOUNTERED IN PREPROCESSED
DATA FILE (LUN 10)
PROCESSING DISCONTINUED

Advanced processing has been attempted for a study which did not survive the preprocessing stage. No further action has to be taken.

ERROR IN DISTANCE CALIBRATION PARAMETERS
CALCNT = X CALDST = Y
CALIBRATION UPDATE IGNORED - PREVIOUS CALIBRATION
WILL BE USED

This study indicates that it was a calibration run. However, either the calibration counts (CALCNT, the count of speed sensor distance pulses) or the calibration distance (CALDST, entered manually by the driver at the end of the calibration run) is zero. This calibration run is ignored. A small likelihood exists that a data transmission error occurred, with a compensating error to correct the checksum. A knowledge of the field circumstances can clarify this remote possibility. Otherwise, the study is processed normally.

VEHICLE CALIBRATION TABLE SIZE EXCEEDED-
INCREASE TABLE SIZE OR DELETE OBSOLETE ENTRIES
ERROR OCCURRED WHILE TRYING TO ENTER VEHICLE X

No more than 100 vehicles can be catalogued in the vehicle calibration table. Consult a programmer to modify subroutine CALDCT or data file CALDICT.

QUESTIONABLE CALIBRATION PARAMETERS - NO DICTIONARY
UPDATE MADE
VEHICLE = X CALIBRATION COUNT = Y DISTANCE = Z

The calibration is out of the range 0.84 through 0.92, which are nominal values expected for the MassTech 6 pole speed sensor. Verify that the proper equipment is being used.

STUDY REJECTED DUE TO ABNORMAL STUDY LENGTH
DISCREPANCY $-$-$-$-$-$-$-$-$-$-$-$-$-$-$-$-$-$-$-

The study length fell short or exceeded the measured study length by more than 300 feet. The study data is not entered in the master files.

VEHICLE X HAS NOT BEEN CALIBRATED
PROCESSING DISCONTINUED **********

This vehicle does not have an entry in the calibration dictionary. Perform a calibration and rerun the study.

DIMENSION SIZE OF DATA ARRAYS IN SUBROUTINE 'CMLDST'
EXCEEDED - - SEGMENT STATISTICS WILL NOT BE REPORTED

This link consists of more than 50 sublinks, so the segment statistics are not listed.

PROCESSING ERROR: BIT 7 OF DATA BYTE IS 1 DENOTING
EVENT BYTE, BUT REMAINDER OF BITS = 0, DENOTING NO
EVENT PUSHBUTTONS RECORDED

This situation is probably due to a field data recording error, or a data transmission error. Try retransmitting the data. If the error persists, note that some event data may be missing.

I. STATPLT Error Messages

RAWDATA NOT FOUND FOR LINK X
STUDY CONDUCTED DD/DD/DD AT TT:TT:TT

A link which appears in the study summaried master file does not appear in the field raw data file. Verify that the full master file was available for this run.

****
NO OBSERVATIONS IN THIS CATEGORY

No studies were found to satisfy the selection criteria. This is considered more an information message than an error message.

LINK NUMBER NOT SPECIFIED ON INPUT -
PROCESSING DISCONTINUED

The link number does not appear on the data specification card.

XIII. MASTER FILE PROCEDURES

The two master files for storing permanent data are RAWDATA(FTO4) and SUMDATA(FTll). File RAWDATA contains the raw field data in a format similar to the field tape recording, but modified for processing by the Fortran program. This file is appended by program PROCESS, and is accessed later by STATPLT if either of the plot options are invoked. Similarly, file SUMDATA is appended by program PROCESS, and is accessed later by STATPLT to develop statistics for multiple runs over the same link. Incidentally, the RAWDATA file could be reprocessed should the need ever arise to apply a new processing technique on historical data.

Once the data are plotted, there is some question as to how long the raw data should be retained. The answer is that it should be for as long as comparisons need to be made over the time period represented by the data. Too, for obtaining a cumulative average speed profile, the data must be available as a basic source. Since the interval over which average speeds are desired may vary, there is additional incentive to keep the raw data available for later processing. The summary data, on the other hand, does not raise as many questions for justification since it does not require as much storage for retention.

The storage requirement (in bytes) for a single study's raw data are given by the formula

$$2\,[24 + \text{duration of study in seconds}].$$

The storage requirement for the summary data is 82 bytes per study.

By contrast, a 30 minute study would require

$$2\ [24+\ 30\ X\ 60] = 3,648 \text{ bytes.}$$

This is not a fair comparison, but it serves to illustrate the contrast.

This wide variation in storage requirements is due in part to the concept of the length of a link. A link here is defined to be the length of the entire study, with sublinks representing the roadway segments normally thought of as links. Naturally, the storage requirement for a sublink representing a quarter mile of freeway would occupy much less storage than a full 30 minute study. With header data, the storage requirement for a quarter mile study at 60 MPH would be

$$2[24 + 1320/88] = 78 \text{ bytes.}$$

Without header information, the same study would require

$$2[1 + 1320/88] = 32 \text{ bytes.}$$

If the pushbutton event data could be deleted, the same study could be stored in 16 bytes.

As of this date, the Tridaqs unit has not been operated over a long period of time to build up a large data base of studies. Consequently, it is not known what operational problems may arise when large files are developed, but two potential areas of difficulty will be discussed. First, there is not a selective study deletion program for the master files. If a study is fully processed, it is recorded in the master files. Later, it may be found that the study is in error, so the need exists for purging the files of unwanted studies. Second, the search time through the raw data file may become prohibitive after, say, a year's data

is accumulated. The raw data set is presumed to be a tape data set, and partitioning of the data for some subset of a year may be advisable. Similarly, the summary data set is presumed to be a tape data set. However, if frequent accesses are being made for non plotting, statistical data, then a disk data set may be advisable.

Until these questions are resolved, the program STATPLT has a provision for rewinding and end fileing the master data sets, effectively erasing the master data once it is processed. Using this feature, multiple processing of raw field data has been effected by saving the data in semi-permanent disk data sets uniquely named, and processing a series of these together. The user may want to continue this practice for special studies.

It is recommended that a master file(s) maintenance program be developed soon, with a minimum function of deleting selected studies.