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 16. Abstract Air quality measurer grade" site and are to be used to characterize carl sources. Measurements at 10 locations, vehicle ler data from four stations h interfaced to a Data Gene simultaneously and on a rwill be used to verify li Experimental data from been assembled and used i model. The improved mode and HIWAY were compared t improved results were obt all of the previous data the current experimental 17. Key Words	ments along Houston e started shortly oon monoxide conce t each site consist ngth, speed and co between five and eral Nova 1200 con capid time basis. In source dispers com essentially along with the so the data from the ained with the mo are based on one program have not	on freeways h at a "cut" s entrations do st of carbon ount by lane, 101.5 feet. mputer which The data fr sion models f 11 previous e verifying an well known m the previous odified model hour average been compare	have been made site. These me ownwind from hi monoxide conce , and detailed All of the ins allows the dat from the experimental or Texas. experimental pr improved road models of CALIN programs. Sig . All of the e concepts. The d to the model	at an "at- asurements ghway line ntrations meteorolog truments a a to be ta ental prog ograms hav way disper E-2, AIRPO nificantly models and e data fro s at this
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Interim Report

on

ANALYTICAL AND EXPERIMENTAL ASSESSMENT OF HIGHWAY IMPACT ON AIR QUALITY

by

J. A. Bullin J. C. Polasek

Submitted to

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Implementation

A study of dispersion of pollutants from roadways is underway. Progress in the model development portion of the work indicates that existing models should be used with caution. An improved model based on data from previous experimental programs is presented. Extensive experimental data from the current project will soon be available for continued model improvement.

Disclaimer

The contents of this report reflect the views of the authors who are responsible for the facts and the data presented herein. The contents do not necessarily reflect the official views or policies of the Federal Highway Administration, nor does this report constitute a standard, specification, or regulation.



Summary

Air quality measurements along Houston freeways have been made at an "at-grade" site and are to be started shortly at a "cut" site. These measurements are used to characterize carbon monoxide concentrations downwind from highway line sources. Measurements at each site consist of carbon monoxide concentrations at 10 locations, vehicle length, speed and count by lane, and detailed meteorological data from four stations between five and 101.5 feet. All of the instruments are interfaced to a Data General Nova 1200 computer which allows the data to be taken simultaneously and on a rapid time basis. The data from the experimental program will be used to verify line source dispersion models for Texas.

Experimental data from essentially all previous experimental programs have been assembled and used in developing and verifying an improved roadway dispersion model. The improved model along with the well known models of CALINE-2, AIRPOL-4 and HIWAY were compared to the data from the previous programs. Significantly improved results were obtained with the modified model. All of the models and all of the previous data are based on one hour average concepts. The data from the current experimental program have not been compared to the models at this time.

iii

TABLE OF CONTENTS

CH	APTER	PAGE
1.	Introduction	1
2.	Description of Field Monitoring Sites in Houston	3
	Introduction	2
	North Loop Site	ン 2
	Katy Freeway Site	7
3.	Experimental Methods	10
	Introduction	10
	Data Collection System	10
	Traffic Measurements	11
	Meteorological Measurements	13
	Atmospheric Temperature and Humidity	14
	Solar Radiation	14
	Carbon Monoxide Measurements	14
	Hydrocarbons and Nitrogen Uxide Measurements	16
4.	Data Handling	17
	Introduction	17
	Data Reduction Program	17
	Format of Computed Averages	20
5.	Diffusion Model Analysis and Development	23
	Introduction	23
	Discussion of Previous Experimental Data	
	Collection Programs	23
	Tennessee Data	23
	North Carolina Data	25
	Virginia Data	26
	California Data	. 27
	Analysic of Instrument Error	27
	Effect of Bag Sampler Material on the	20
	Accuracy of Measurement	30
	Discussion of Previous Model Developement	50
	Programs	30
	Caline-2	30
	Hiway	32
	Airpol-4	36
	Emp-1	39
	Model Validation	40
	Development of Improved Model	41

TABLE OF CONTENTS continued

CHAPTER

PAGE

6.	Discussion of Results	
	Discussion of Experimental Data Collection Program	47
	Discussion of Dispersion Model Analysis and Development	47
	Summary	
	Literature Cited	
	Appendix A	79
	Appendix B	90
	Appendix C	97

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LIST OF TABLES

<u>No</u> .	Title	Page
1	Data Sampling Rate	4
2	Record Formats	18
3	Accuracy of Instruments Used in Data Acquisition	29
4	Summary of Regression Analysis of Roadside CO Concentrations	45
5	Data Locations	55
6	Five-minute Averages for Data Taken from 14:55 to 16:00 4 May 76	56
7	Fifteen-minute Averages for Data Taken from 14:45 to 16:00 4 May 76	63
8	Hourly Averages for Data Taken from 15:00 to 16:00 4 May 76	66
9	Five-minute averages for Data Taken from 16:00 to 17:00 4 May 76	~ 67
10	Fifteen-minute Averages for Data Taken from 16:00 to 17:00 4 May 76	73 ·
11	Hourly Averages for Data Taken from 16:00 to 17:00 4 May 76	75

LIST OF FIGURES

No.	Title	Page
1	Aerial View of Instrument Configuration, Loop 610 Site	5
2	Cross-Sectional View of Instrument Configuration, Loop 610 Site	6° "
3	Aerial View of Instrument Configuration, Katy Freeway Site	8.
4	Cross-Sectional View of Instrument Configuration, Katy Freeway Site	· 9· 、
5	Virtual Origin Concept	43
6	Overhead View of At-grade Site as Seen by Hiway Model	34
7	Coordinate System Used by Hiway Model	35
8	Coordinate System Used by Airpol-4	37
9	Regression Lines of Models for Tennessee Data	50
10	Regression Lines of Models for North Carolina Data	51
11	Regression Lines of Models for Virginia Data	52
12	Regression Lines of Models for Illinois Data	53
13	Regression Lines of Models for California Data	54

Chapter I

Introduction

Project 2218, "Analytical and Experimental Assessment of Highway Impact on Air Quality", is being used to validate existing mathematical models for dispersion of air pollutants along a highway. This project will also improve on the accuracy of these models where feasible. Mathematical models are currently used to predict future levels of carbon monoxide along highways for various meteorology, topography, and highway conditions.

Currently, the Federal Highway Administration requires an estimate of the carbon monoxide concentrations along proposed new highways or where major improvements are proposed to existing highways. The carbon monoxide levels are predicted for the time when the highway is built and at intervals until 20 years afterward. These predictions are included in the Air Quality Reports which are reviewed by many governmental agencies including the Texas Air Control Board, the Federal Highway Administration, the Environmental Protection Agency and others.

Highways which would seriously degrade the air quality would probably not receive federal financing. The National Ambient Air Quality Standards are used as a basis of judging the air quality. The current work is particularly important since it will establish the validity of applying mathematical models, which were developed outside of Texas, to Texas.

There have been many models proposed to predict pollutant concentrations from roadways. However, there have been only a few experimental validation programs undertaken and these have met with varying degrees of success. The current validation program for Texas is designed for thorough data collection.

The measurements required for model validation work are vehicle numbers, speed and classification (car or truck), wind speed and direction, atmospheric stability and carbon monoxide concentrations at various distances from the roadway. The current validation project is set up to take all of the required measurements simultaneously by using a minicomputer to read the instruments and record the data on cassette magnetic tapes.

Two sites for data collection in Houston have been selected. The "at grade" site is at North Loop and Link Road in Houston while the "cut" or below grade site is at Katy Freeway and Reinermann Road. The current plans call for data collection in Houston this year and in Dallas, San Antonio, and El Paso next year.

Chapter II

Description of Field Monitoring Sites in Houston

Introduction

Field investigations were undertaken at two locations in Houston, Texas. These included an at grade site and a cut site. The locations were at 843 Link Road at Loop 610 and Katy Freeway at Reinermann Road. Due to the requirements of the site, very few locations in Houston are suitable.

North Loop Site

Measurements have been made at the North Loop Site during the period from May 1, 1976 to June 30, 1976. This site was chosen due to the large right of way width and suitability for erection of equipment. At this point the Freeway runs east-west and results in a good location since the prevailing wind is from the south.

The site is somewhat typical of the urban city in that trees and one story houses are located to the south as well as to the north. A diagram of the site is shown in Figure 1. (The symbols used in Figure 1 are defined in Table 1.) At this location the ground is essentially flat and the roughness is due to the trees and houses. The instrumentation at the Link Road Site include 12 Ecolyzers, 10 radars and 5 sets of meteorological instruments. Solar radiation is monitored by a global pyranometer. Ecolyzers are used to measure the carbon monoxide and are mounted in pairs in metal boxes. Each pair is located at a specific distance from the roadway as shown in Figure 2. This figure also shows the heights at which the various instruments are located as well. There are essentially four stations located on the down wind side of the freeway and one on the up wind side in order to obtain a background level. The lower Ecolyzers sample the ambient air at "breathing height" (1.5 meters), while the upper Ecolyzers analyze the air at 10 meter heights. In addition, two

INSTRUMENT LIST

NAME	CHANNET	TNCTDIMENT	SAMPLE	DELCON GUOGEN
1111111	OIMMIN	INSTRUMENT	INIERVAL	REASON CHOSEN
RAD0	1	Radar	.01 sec	Special
RAD1	2	11	11	handling
RAD2	3	11	11	"
RAD3	4	11	11	11
RAD4	5	TT	11	11
RAD5	6	tt.	ŦŦ	11
RAD6	7	11	11	11
RAD7	8	11	11	**
RAD10	9	и	11	ŦŦ
RAD11	10	11	Ħ	ŦŤ
VA1.5m	11	1.5 meter vertical anemometer	2 sec	4* highest frequency
VA10m	12	8 11 11 11	4 sec	11
VA20m	13	16 " " "	5 sec	11
VA4 Om	14	30 " " "	5 sec	TT
HA1.5m	15	1.5 meter horizontal anemometer	15 sec	1 recovery time
HA10m	16	8 " " "	15 "	- 11
HA2Om	17	16 " " "	15 "	11
HA4Om	18	30 " " "	15 "	11
WV1.5m	19	1.5 meter wind vane	5 sec	4* highest frequency
WV1.Om	20	8 " " "	5	11
WV2Om	21	16 " " "	5 .!!	11
WV40m	22	30 " " "	5 "	11
TM1.5m	23	1.5 meter thermometer	60 sec	11
TMP10m	24	9 " "	60 "	11
TMP20m	25	13 " "	60 "	11
TMP30m	26	25 " "	60 "	11
RH1.5m	27	1.5 meter psychrometer	60 sec	**
RH30m	28	25 ^m	60 4	TT
PYRAN	29	Heliopyranometer	60 sec	11
CO1H	30	Ecolyzers	30 sec	1 recovery time
CO1L	31	11	11	
CO2H	32	11	**	**
CO2L	33	. 11	11	"
СОЗН	34	11	11	11
CO3L	35	Н	11	11
CO4H	36	11	11	11
CO4L	37	11	11	11
СО5н	38	11	**	11
C05L	39	**	11	11
СО6Н	40	"	11	11
C06L	41	11	11	11



տ

FIGURE 2 INSTRUMENT LOCATIONS LOOP 610 HOUSTON

δ

① = VA1.5M, HA1.5M, TM1.5M, WV1.5M, RH 1.5M ② = VA 10M, HA10M, TMP 10M, WV 10M ③ = VA 20M, HA20M, TMP 20M, WV 20 M ④ = TMP 30 M, RH 30 M ⑤ = VA40M, HA 40 M, WV 40 M

5 TCO4H



Ecolyzers analyze air samples at 20 meters and 40 meters up the tall tower.

The meteorological instruments are located on the tall tower at the locations shown on Figure 2. This tower was located 64 ft. from the roadway. The traffic monitoring radars were mounted on two sign bridges which were 500 ft. to the west and 1100 ft. to the east.

Katy Freeway Site

It was desired in the program to measure the carbon monoxide level from a section of roadway that was below grade which is also known as a cut site. The instrumentation and configuration are somewhat different at the cut site from the at grade site. The presence of a pedestrian overpass with a concrete pipe rack at the cut site greatly simplifies the installation of the equipment. It also provides easy access to service the equipment and for calibration. The site is located at 5200 Katy Freeway and Reinermann Road. At this point the freeway is about 22 ft. below grade. A diagram of the roadway is shown in Figure 3. Katy Freeway runs in an east-west direction and has very light traffic on the service roads. The surface roughness of the area is again trees and one story This combined with the wide right of way and the pedestrian walkway buildings. makes this site a very desirable one. At this location the shoulders of the road way are cut at approximately a 30 degree angle leading down to the payement.

The instrumentation is deployed as shown in Figure 4. The availability of the pedestrian walkway allows a sample to be taken at the center median between the two directions of traffic. The meteorological equipment is mounted on the tall tower located on the north side of the freeway.

The equipment has been erected at this site and data collection is ready to begin.





Chapter III

Experimental Methods

Introduction

An extensive program of experimental measurements is underway for this study. The measurements required for model validation work are traffic measurements, meteorological conditions and air pollution levels. The current program is set up to take all of the required measurements simultaneously by using a minicomputer to read the instruments and record the information on magnetic tapes. All of the instruments are tied to a Data General NOVA 1200 computer through an analog to digital interface. The details of the data handling procedure will be discussed in the next chapter. The systems used to make the experimental measurements will be discussed here.

Data Collection System

 $\mathcal{C}^{(n)}$

For this study, a NOVA 1200 mini-computer with 3 cassette tape drives, a teletype console and a Radian A-D converter is used. The computer is used to read and record onto magnetic tape each instrument at a rate commensurate with the instrument response time and the rate of data fluctuation. Table 1 in page 4 gives each instrument's sampling rate, as well as its six-letter code which the computer uses to name each instrument. The required software program is quite sophisticated and was written by File D-19 of the State Department of Highways and Public Transportation in Austin. This software has been modified in minor ways by the project personnel.

The computer is a very valuable tool in data collection. It can read all instruments effectively simultaneously and can check each instrument reading against a maximum and minimum expected value. This expected value can be set by the operator and varies from instrument to instrument. If a value falls outside the expected range, the operator is so informed by the teletype and a special

record is entered on the cassette tape. The rate at which the data are collected for each individual instrument will be discussed in the following sections. (See Table 1, page 4.)

Traffic Measurements

Four traffic parameters must be determined for the purpose of this study. They are the vehicle age mix, heavy duty vehicle fraction, the vehicle count and the vehicle speed. The vehicle age mix must be approximated by using figures obtained from vehicle registrations in the area. The other three parameters were obtained by using a Stevenson Mark 5 Radar Unit mounted over each lane.

These units were obtained from the Department of Public Safety and had to be modified for use on the project. The units were originally designed for use inside of a vehicle and thus were modified by mounting them on 10 inch "C" clamps and providing a weather proof shelter for them.

These devices can give a very fast and accurate measurement of a vehicle speed while the vehicle is within the unit's field of view. The size of the field of view can be varied both in length and diameter by use of the range control adjustment on the unit. To obtain the traffic parameters needed, the units must be used in a special way. Each unit is located directly above a single traffic lane looking down at a 45° angle. The range control is turned down until the indicator needle on the unit just barely detects compact cars. This restricts the units field of view to an elliptical path approximately 15 ft. long and 10 ft. wide at the pavement. This procedure has worked well but an analog integrator has been built which hopefully will give a more accurate reading of the observed length. Because of the angle at which the unit is mounted, the observed vehicle speed is only 71% of the actual value. However, this can be easily corrected by the computer.

The radar units have both an indicator needle and a 0 to 10 volts recorder output. Since a car moving at 60 miles per hour spends only 1/2 of a second in

the unit's field of view, the indicator needle does not have time to respond before the car is out of the field. However, due to its speed the computer can obtain the full response from the unit. The radar unit sends a voltage pulse to the computer for each vehicle passage. The height of the pulse is proportional to the vehicle's speed and the number of pulses is equal to the number of vehicles resulting in an accurate vehicle count. These pulses can yield yet another item of useful information. The area under the pulse is proportional to the length of the vehicle. This allows the cars to be separated from trucks, giving an accurate breakdown of the heavy duty vehicle fraction. To obtain the area under the pulse the computer is required to do a numerical integration. Since most pulses coming from the radars are less than 1/2 second long, the radars are monitored at a very high rate of speed. A sampling rate of 100 samples per second was selected as the highest practical rate. At this rate, the NOVA computer is idle only 5% of the time. 94% of the time the computer is processing the radar units. 1% of the time is sufficient to handle all other samples, compute averages, and to run the cassette units and teletype. The numerical integration method used is the fastest in terms of computer time available. The readings are simply summed for the duration of the pulse and then divided by a calibration factor after the pulse is over. The result is then compared to the five length catagories selected by the programmer and the appropriate counter is incremented by one. The speed is also summed with the appropriate vehicle speed accumulator. At the end of each one minute interval the vehicle speed count and length information are averaged and written to the cassette tape.

The five vehicle categories were chosen as category 1-cars, category 2-pick-ups and vans, category 3-light trucks, category 4-heavy trucks, and category 5-calibration. The radar units have an internal calibrate capability and

thus can be calibrated periodically.

Several problems arose in the application of the radar units to the project. At the North Loop Site it was discovered that there was a large amount of 60 cycle noise in the lines. Low pass filters were added as a temporary measure and shielded cable was later added to correct the problem. At the North Loop Site the shielded cable completely corrected the problem on the west sign bridge but had no effect on the noise from the east sign bridge. This is currently being investigated and the low pass filter will continue to be used until it is corrected. A second difficulty arose in the range control on the radar units. The 3/4 turn potentiometers used to adjust the range control in the original units was a very course adjustment. The potentiometers were replaced with 10 turn pots which have worked very well.

Meteorological Measurements

Horizontal Windspeed and Direction:

Horizontal windspeed and direction were measured continuously with 6 cup anemometers and windvanes manufactured by Texas Electronics. The starting threshold for the anemometers is 0.75 MPH and 1.0 MPH for the windvanes. The accuracy of the wind speed is $\pm 1\%$ of full scale and $\pm 0.5\%$ for the wind direction. The anemometers use the light chopper technique while the wind direction vanes consist of potentiometers in a one volt curcuit.

A Gill propeller anemometer (Model No. 27100) is used to determine the vertical wind speeds. This instrument has a starting threshold of less than .5 MPH and an accuracy of $\pm 1\%$ of full scale.

In order to obtain a good description of the wind profile, stations containing horizontal windspeed and direction and vertical windspeed are located at heights of 5, 26, 52, and 102 ft. This equipment has been very trouble free. The only

problem has been the replacement of the light emitting diode at the top location on the tall tower. Lightning is believed to be the culprit here.

Atmospheric Temperature and Humidity

To obtain information on atmospheric stability, temperature is recorded at 4 different heights. Temperature measurements are made with a Texas Electronics Model No. 2015 Thermistor. These units have an accuracy of \pm 0.5% of full scale. One sensor is located at each of the heights 5, 29, 42 and 82 ft. as shown in Figure 1. With such detailed wind speeds and temperature, it is hoped that Richardson numbers may be reasonably accurately calculated.

The relative humidity is measured at two heights of 5 and 82 ft. and with a Texas Electronics Model No. 2013 relative humidity system. The accuracy of the instrument is better than \pm 3% relative humidity. The psychrometer measures relative humidity by utilizing the fact that a fiber, such as a hair, will change length in proportion to the amount of water vapor present. As the fiber length changes it causes an inductance change in a coil.

Solar Radiation

The incoming solar radiation is measured with an Eppley pyranometer Model No. 8-48. Due to the low voltage output from this instrument an amplifier had to be constructed for the signal to feed the analog to digital interface. This instrument has worked very trouble free.

Carbon Monoxide Measurements

The concentration of the carbon monoxide levels from the road is measured by model 2600 Ecolyzers. The analyzer uses an acid electrochemical sensor to determine the quantity of carbon monoxide in parts per million, with an accuracy of + 0.5 ppm. These analyzers are easy to operate, but span and zero drift require

very frequent calibrations of the instrument. The accuracy of the instrument is affected by the pH value of the acid in the cell. Thus as the cell ages the accuracy tends to decrease. In addition, under the current operating conditions the instruments exhibit some fluctuations due to internally generated noise. With careful attention and frequent calibration these instruments have provided carbon monoxide levels with a error of no greater than 1 part per million of carbon monoxide.

As shown in Figure 2, carbon monoxide levels are measured at heights of 5 and 35 ft. above the ground and at distances from the road way of 15, 36, 79, and 165 ft. An upwind station at 130 ft. from the road way was also used. The carbon monoxide levels at 47 and 101.5 ft. above ground are also measured at the station located at 56 ft. from the road. The measurements at the elevated sites are made by pulling a sample of air from the elevation down to ground level with a small vacuum cleaner. The Ecolyzers are connected upstream of the vacuum cleaner.

The Ecolyzers are calibrated by attaching bags of calibration gas to the instrument. The normal calibration interval is 2 hours. When the Ecolyzers analyzing samples from the elevated height are calibrated, a manometer is used to insure the flow to the instrument remains the same during calibration as when in actual operation. The samples are drawn from the elevated point through black 1 inch polyethylene thin wall tubing. In all cases the tubing was allowed to sit on the pole for several days before actual use.

All Ecolyzers are read by the computer at the rate of once every 30 seconds. The measured response time of the instrument was about 25 seconds.

A second sampling system consisting of sequential bag samplers is also used. Each bag sampler is composed of a container that holds 24 PVC bags, a pump for each bag, 6 volt dry cell batteries for power and the necessary circuitry for

control. During the period of operation, a bag sampler energizes each pump sequentially allowing each one 15 minutes of running time for a total of 6 hours of operation. Thus each bag will yield a carbon monoxide concentration that will be wery close to the 15-minute average calculated by the computer for the Ecolyzers. The pumps were set to deliver 60 milliliters per minute, which yields a sample volume of about 900 milliliters. When the bag sampler has cycled through all the pumps, the timer shuts it down. The bags can then be analyzed by an Ecolyzer, non-dispersive infrared instrument or other device.

The bag samplers have proven to be quite troublesome from an operational point of view. The timer sometimes skips over several bags; often the check valves remained open and the sample is lost; and the output of the pumps is rather unstable. In addition there are up to 240 bags to be analyzed which can require 2-1/2 to 3 hours. Finally, once all the bags have been analyzed they must be emptied by hand to remove any residual samples to prepare them for the next sequence.

Hydrocarbons and Nitrogen Oxide Measurements

The instruments to analyze for hydrocarbons and nitrogen oxides are currently being delivered. After a short check out time these instruments will also be used.

Chapter IV

Data Handling

Introduction

As a result of the desire to obtain a dynamic response, data collection in the project occurs at a prodigious rate. Over 15,000 numbers per hour are recorded on cassette tape. A printout of the original data for an eight-hour day would be over an inch thick with twenty numbers per line, thirty lines per page. In its original form, the data are thus nearly worthless. The sheer volume prevents any trends from being noticed. For preliminary data reduction and analysis, the researcher must turn to the computer.

The computer cannot reach conclusions by itself. However, it can manipulate the data in such a way that it becomes useful.

Data Reduction Program

The objective of the data reduction program is to reduce the amount of data from one hundred thousand numbers per day to possibly as few as one thousand. Regrettably, some of the fine detail of the original data is lost, but it suddenly becomes possible to see the whole picture and some pattern to the data.

The data originally resides on a one track cassette in sixteen bit word variable length record blocks. This means each number contains sixteen bits, the collections of numbers (records) are not all the same length, and that a large number of records are output to tape at once in a block. All data are in binary form. Integers are represented directly and character data are represented in ASCII code, two letters per sixteen bit number (word). Record formats can be found in Table 2. The length of type 0,5,11,...17 records is determined by the amount of computer memory available after the program is set up. Sizes of up to 120 numbers/record have been used, but with the addition of more instruments, the size will have to

TABLE 2

Record Formats

Type Ø, 5 Type 1 Type 2,3,6,7 Type 4 Type 10 Type 11, ..., 17 Length Length Length Length Length Length Type Туре Type Туре Type Type Time high Time high Time high Time high Time high Time high Time low Time low Time low Time low Time low Time low ASCII code Channe1 Channel Channel Channe1 Channel Sample Interval bad time high sample interval Interval data type bad time low min expected value Lost data count . max expected value bad value max expected value min expected value min expected value begin time high max expected value calibration factor begin time low sample value zero adjustment factor end time high sample value ASCII code end time low ASCII code ASCII code veh 1 count ASCII code veh 1 spd high veh 2 count veh 2 spd high veh 2 spd low sample value

> Veh 5 count veh 5 spd high veh 5 spd low

be dropped to 40 numbers/record until an additional 8K of memory arrives.

Data in this form are easily handled by NOVA computers. However, the AMDAHL 470 V6 used at Texas A&M cannot read cassette tape. For this computer to reduce the data it is first necessary to have them transferred from cassette onto nine track computer tape which the AMDAHL can access.

This transfer is done by a direct copy method. No changes or checks are made by the transferring program. Thus, the nine track tape obtained still contains the data in its original recorded form. This form is incompatible with IBM (and AMDAHL) standard conventions, and as a result, the standard software for unpacking the blocks into individual records and for breaking the records into individual numbers cannot be used. The records must be broken down by programmer written software and then repacked in the standard conventions. The program to do this has been labeled Set A and a copy can be found in Appendix A.

This makes it very easy for the Set B program to get to the individual records. Set B has two functions to perform. It converts all the integers to more useful forms and it sorts the data, getting together all records dealing with a particular channel. The conversion comes in two parts. First all character data must be converted from ASCII to EBCDIC, which is used by the AMDAHL to store characters. Secondly, all instrument readings are more useful in floating point numbers than as raw integers: 2.5 ppm is easier to comprehend than 100 A/D counts. The data is thus restructured and then temporarily stored on a scratch disk.

The sorting is then handled by a standard IBM OS Sort/Merge Utility. This packaged program can very rapidly sort as much data as there is external scratch space. It pulls the stored data from disk and sorts them first by date, by channel, by record type and by time in that order. It then outputs the result to standard nine track tape.

÷.

In this form, the data are ready for the third part of the data reduction called Set C. An example of Set C can be found in Appendix C. In the same appendix is a sample of the results of this program. This is the real data reduction program. It takes the modified and sorted data and uses them to calculate total traffic counts and speeds and instrument means and standard deviations for every instrument for a given time period. Five-, fifteen-, and sixty-minute intervals were chosen as representative, but those can be changed as desired.

Format of Computed Averages

The data printout as shown in Table 5 (page 56.) contains a somewhat graphic picture of where the instruments are located. Titles were omitted in order to achieve two averages per page of printout and cut down on the high cost of computer printing. The center of the average contains the traffic counts of the ten radars and the observed average speeds. The eleventh column on the right contains the total vehicle count for each type of vehicle along with the average speed for each type. The rows represent the vehicle types aforementioned. The sixth row is the total by lane count of all vehicles with their average speed. The three numbers below the table are the count and speed in each direction and the grand total count and average speed. It can be noted in passing that the 55 mph speed limit was being observed only in the exit lanes and during traffic jams. The upper right hand corner contains all meterological data. The columns are from left to right: Vertical windspeed in tenths of a mile per hour, horizontal windspeed in miles per hour, wind direction in degrees, temperature in degrees Fahrenheit, and radiation in watts per square meter and relative humidity in per cent in the last column. The vertical arrangement of the numbers represents the arrangement of the instruments except that the higher relative humidity readings should be level with the top thermometer reading.

The third section of the average is the lower right and the lower left. These readings represent the carbon monoxide levels in parts per million. The background instruments are separated from the rest of the instruments by the traffic table, and the arrangement of the entries on the right hand side is identical to the arrangement of the instruments at the site.

It should be noted that each entry for the meteorological instruments and carbon monoxide monitors is double. The upper number of each pair is the mean instrument value for the time interval, and the lower number is the standard deviation of all the values. It should be noted that the Ecolyzers require some special handling in this program. Since their zero and span tend to drift, they were calibrated at approximate two-hour intervals. The procedure followed was to issue a Begin Calibrate record (Type 2), ground the A/D input for the channel, rezero the instrument, attach a bag of gas of known CO concentration, reattach the instrument to the A/D, wait 30 seconds, reground the A/D input, wait one minute, reattach the instrument to the A/D and issue an End Calibrate record (Type 3) for the channel. An attempt was made to also read the zero drift before rezeroing the instrument, but study showed that zero drifts were sudden and drastic, although small enough to be completely masked by the minute-to-minute fluctuations in the CO level. However, at very low CO levels, the zero drift can approach 30% of the instrument reading. Thus, no correction could be applied and the obtained value was worthless. Span drift, however is smooth and gradual as far as is known. Thus, a linear correction factor was applied. These corrections were fairly small (& 10%). If during any averaging period, more than one fourth of the data is missing for an instrument, the average is dropped and is replaced in the output with stars.

Due to the averaging of the results, much of the fine detail is lost. However, by using the results of the averaging program, better methods can be found for analyzing the data at a later date. At present, the averaging program is sufficient for the project needs and provides an adequate data base for preliminary conclusions.

Chapter V

Diffusion Model Analysis and Development

Introduction

In attempting to comply with the laws requiring environmental statements for construction and modification of roadways, several research programs have been undertaken. These programs have met with varying degrees of success. Many people have attempted to develop models to predict pollutant concentrations from roadways with no experimental verification whatsoever. Essentially all of the experimental data collection programs which have been undertaken are discussed here. All of the major dispersion models are also reviewed. All work to date excluding the present experimental work is based on the concept of one-hour samples and averages. This is the largest data base on dispersion from roadways ever assembled and the first extensive comparison of previous models.

Discussion of Previous Experimental Data Collection Programs

Tennessee Data

The data obtained by Noll, Miller, Rainey, and May (1975) were taken at Gallatin Road in north Nashville, Tennessee. The road used was a five-lane at-grade highway with a total width, including shoulders, of 80 feet. The area around the highway is essentially a flat, open field.

Traffic counts were taken continuously with pneumatic counters. This device counts each vehicle axle crossing the detector. In order to assure good data, no more than two lanes of traffic were monitored with one pneumatic counter. Fifteenminute averages of double axles were recorded and used to obtain values for the traffic flow in vehicles per hour. Vehicle speed was monitored with radar units and with a clocking method. This clocking method consisted of timing vehicles over a known distance and calculating the speed from the time obtained. The radar unit was not considered to give good representative route speeds; therefore,

the clocking method was preferred. A course length greater than 500 feet and a stop watch were used in providing the route speed. The heavy duty vehicle mix was obtained by manual counts.

The wind speed and direction were continuously monitored with mechanical wind instruments at a height of 10 meters. The data were recorded onto strip chart paper. The wind instruments were checked for calibration twice daily. Three different methods were used in obtaining CO samples.

- 1) on-line continuous sampling
- 2) intermittent sequential sampling (ISS)
- 3) fifteen-minute integrated sample

The on-line sampling was used to obtain data at a single point with the results being recorded on to strip chart paper. The ISS method involved several sampling points connected to a common manifold. This allowed all the sampling to be done with one analyzer. The integrated samples were obtained with bag samplers. The samples were later collected and analyzed.

The type of bag used was an aluminized polyester (Scotchpak) bag. As discussed in a succeeding section, this type of bag was found to be the best suited to hold carbon monoxide.

In analyzing for carbon monoxide, two instruments were used, a Beckman Model 315-BL non-dispersive infrared (NDIR) absorption instrument, and an Energetics Science Ecolyzer coulometric titration instrument. The error of the NDIR can be considered to be 1 percent of full scale, which translates to ± 1 ppm. The span drift of an Ecolyzer is ± 1.0 percent of full scale, which translates to an error of ± 1 ppm. The zero drift of the Ecolyzer is ± 0.5 percent of full scale which translates to ± 1 ppm. It should be noted that the above figures are for an Ecolyzer which has a new electrochemical sensor and is calibrated frequently (approximately every two hours).

The instruments used were calibrated after each peak traffic hour's sampling runs with a certified 38 ppm carbon monoxide span gas. From the above discussion, an estimated accuracy of + 1.5 ppm for instrument readings was obtained.

North Carolina Data

The data presented by Noll (1973) were taken at the First Street - Hawthorne exit of Interstate 40 in Winston-Salem, North Carolina. This is a four-lane, at-grade highway with a total width of 56 feet.

Traffic volume data were taken with two electrical traffic counters, one in each directional lane group. Fifteen minute averages of the double axles were recorded and used in obtaining an hourly traffic volume. The average route speed was determined using the "floating car" technique, and the heavy duty vehicle mix was determined by manual count.

The wind speed and direction were continuously monitored with mechanical wind instruments at a height of 12 feet (3.66 meters) and recorded onto strip chart paper.

Similar to the previous data set, three different procedures were used in obtaining carbon monoxide samples. These were

- 1) Continuous on-line sampling
- 2) Short period cycle sampling
- 3) Fifteen minute integrated sample

Here again, on-line sampling was performed to obtain data at a single point. The short period sampling involved several sampling points connected to a common manifold, which allowed the sampling to be done with one instrument. Bag samples were taken every 15 minutes and later analyzed. As in the previous data set, aluminized polyester (Scotchpak) bags were used. The same type of instruments were used here as were used in the previous data set. Calibration of the

instruments was performed at least three times a day with a two point certified zero span gas and upscale span gas. The accuracy of these data sets was estimated to be ± 1.5 ppm.

Virginia Data

The data given by Carpenter, Clemena, and Lunglhofer (1975) were taken at several sites in Virginia. The locations of interest are

1) Interstate 495 near Telegraph Road in Fairfax County Virginia

2) Interstate 64 near Hampton Boulevard in Norfolk, Virginia

3) Interstate 64 near Norview Avenue in Norfolk, Virginia The first is an at-grade, six-lane, dual-divided highway with a 37-foot median. One side of the highway is open while the other side contains scattered single family housing. The second site is an at-grade, six-lane, dual-divided highway with a 60-foot median. The land use in this area is primarily agricultural. The third site is an at-grade, six-lane, dual-divided highway with a 60-foot median. Both sides of the roadway contain single story houses.

Traffic counts were taken manually for each test period. A radar unit was used in determining vehicle speed, and the resulting data were recorded onto strip charts. Calibration of the radar units was done every two hours of continuous use.

Wind speed and direction were continuously monitored at a height of 10 meters during each test period. This was done with mechanical wind instruments.

Bag samplers equipped with aluminized polyester (Scotchpak) bags, were used in obtaining samples for carbon monoxide analysis. The one hour integrated samples were simultaneously collected at the sampling points of a roadway site. The samples were collected and analyzed at the end of each day with a gas chromatograph. Calibration of the chromatograph was done daily using a certified span gas. Since the zero and span drift of a gas chromatograph are negligible, the instrument was considered to be very accurate. The estimated accuracy of the gas chromatograph was

estimated at 1 percent of scale, which translates to + 0.1 ppm.

Illinois Data:

The data given by Habbeger, et al. (1974) were taken on Interstate 55 near Cicero Avenue in Chicago, Illinois. This is an at-grade, six-lane highway with a 61-foot median. One side of the roadway is an open field and the other had some residential and commercial buildings.

Traffic counts were performed manually for two 5-minute intervals, evenly spaced, every hour. These values were then used in determining the hourly traffic flow. The route speed was determined by clocking vehicles over a predetermined distance. Heavy duty vehicle counts were done manually.

Wind speed and direction data were obtained with a mechanical weather station at a height of about nine feet.

Carbon monoxide samples were obtained with a bag sampler equipped with aluminized polyester bags. The 60=minute integrated samples were analyzed with an Ecolyzer. The instrument was calibrated daily with a span gas and also tested for calibration against a gas chromatograph. Since the Ecolyzer was calibrated only once daily, the accuracy associated with this instrument may range from ± 1 ppm to as much as ± 3 ppm. As previously noted, an Ecolyzer needs frequent calibration in order for its accuracy to remain in the range of ± 1 ppm. Hence the accuracy of this data set was estimated to be ± 2.5 ppm.

California Data

The data given by Ranzieri, Bemis, and Shirley (1975) were for the San Diego Freeway at Weigh Station in Los Angeles, California. This is an at-grade, 8-lane highway with a total width of 138 feet. The highway is surrounded by an open grassy field on one side and a golf course on the other.
The traffic data for this site were obtained from yearly traffic census pads located approximately one-quarter of a mile from the site. The route speed was determined by the "floating car" technique. This was done during peak and offpeak traffic hours.

The wind speed and direction data were monitored with a mechanical weather station at a height of 10 meters and recorded onto strip chart paper.

Carbon monoxide samples were obtained with bag samplers equipped with alumini ed polyester (Scotchpak) bags and analyzed with a Beckman model 315BL nondispersive infrared (NDIR) analyzer. The analyzer was calibrated once daily with a zero and 90 ppm span gas. Because of the tendency of an NDIR to remain within its design zero and span drift limits, the lack of frequent calibration did not present a serious problem. The accuracy obtained by this instrument was estimated to be l percent of full scale which translates to + 1 ppm.

Analysis of Instrument Error:

In arriving at a valid estimation for the error of measurement, the accuracy of the above instruments was considered.

The design specifications of the instruments used are listed in Table 3. From the accuracies given in this table, an error of ± 1 ppm seems appropriate for all the readings.

It should be noted that the zero and span drift on the Ecolyzer are a function of the age of the electrochemical sensor used in the instrument. The sensors used have a shelf life of 120 days and must be replaced at the end of this period to ensure accurate results. Using 10-month old sensors and a certified span gas, it was found that the zero drift was 1.5 ppm and the span drift was 2 - 3 ppm in an eight-hour period. Hence, the accuracy indicated in Table 8 may be overestimated for the case of old sensors.

			the second se	the second s
Instrument	Zero Drift per 24 hours	Span Drift per 24 hours	Accuracy	Scale Used
Beckman Model 315BL NDIR	l percent full scale	l percent full scale	± 1 percent full scale	0 - 100 ppm
Energetics Science Ecoly- zer Model 2400	0.5 percent full scale	l percent full scale	± l percent full scale	0 - 50 ppm
Gas Chroma- tograph	l percent full scale	l percent full scale	± 1 percent full scale	0 - 10 ppm

TABLE 3. Accuracy of Instruments Used in Data Acquisition

Effect of Bag Sampler Materials on the Accuracy of Measurement:

The bag materials used in the bag samplers may greatly affect the validity of the data obtained. In a special study, Ranzieri, Beamis, and Shirley (1975) tested several bag materials. The materials tested were aluminized polyester (Scotchpak), clear Mylar, and opaque Mylar. Tests showed the Mylar bags yielded consistently higher carbon monoxide (sometimes more than double) readings than the Scotchpak bags when collecting the same ambient sample. Thus, the aluminized polyester bags were found to be made suitable for carbon monoxide sampling. It was also found that there is no decay in CO concentration when the sample is held (for up to 92.5 hours) in a bag made of Scotchpak. The aluminized polyester bags have also been tested and accepted by the California Air and Industrial Hygiene Laboratory in Berkeley, California. Since all the bags used in obtaining the data presented were made of Scotchpak, it is assumed that the carbon monoxide concentrations were not altered by the bags.

Discussion of Previous Model Development Programs

CALINE-2

This model is based on the work of Turner (1970), and Ranzieri, et al. (1975). CALINE-2 employs a fixed box model together with a Gaussian dispersion model. The box model is used to simulate the initial dispersion of pollutants caused by the mechanical turbulence from the moving vehicles. The box model assumes the emissions are uniformly distributed over the roadway and up to a fixed height termed a "mixing lid". The height of this 1fd was empirically derived from an experimental program known as "Project Smoke" performed by the California Division of Highways (1972). The mixing height was determined to be about 12 feet. The width of the box is determined by adding the width of all the traffic lanes, plus the median and an extra distance equal to about 10 feet on each side of the highway.

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The concentrations at a downwind distance from the roadway are predicted through the use of both the continuous line source equation and the continuous point source equation. The assumption made in obtaining the solutions to these equations are

1.) Gaussian distribution in both horizontal and vertical planes

2.) Dispersion coefficients are a function of downwind distance

(1)

(2)

3.) The wind speed is constant with height.

4.) Dispersion is independent of site topography. The equations used in the model are for crosswind line sources:

 $\Psi_{c} = \frac{Q_{1}F_{1}}{\sqrt{2\pi}\sigma_{z}u} \left\{ \exp \left[-\frac{1}{2}\left(\frac{z+H}{\sigma_{z}}\right)^{2}\right] + \exp \left[-\frac{1}{2}\left(\frac{z-H}{\sigma_{z}}\right)\right] \right\}$

where

 $Q_1 = VPH \times EF$

VPH = vehicles per hour,

EF = emission factor

H = height of pavement above ground surface

F = conversion factor

For parallel wind line sources:

$$\Psi_{p} = \sum_{i=1}^{\infty} \frac{Q_{2} F_{2}}{2\pi\sigma_{y_{i}} \sigma_{z_{i}} u} \left\{ \exp\left[-\frac{1}{2}\left(\frac{y}{\sigma_{y_{i}}}\right)^{2}\right] \right\}$$

$$* \left\{ \exp\left[-\frac{1}{2}\left(\frac{z+H}{\sigma_{z_{i}}}\right)^{2}\right] + \exp\left[-\frac{1}{2}\left(\frac{z-H}{\sigma_{z_{i}}}\right)^{2}\right] \right\}$$
where

where

$$Q_2 = Q_1 \times W$$

W = highway width

The assumption is made that a highway with a parallel wind can be approximated by the summation of a series of square area sources, each having the same source strength but at a different distance from the recepter. The area sources are, in turn, approximated by virtual point sources.

For oblique winds (0 deg < angle < 90 deg), the downwind concentration is calculated through the use of the trignometric identity, $\cos^2\theta + \sin^2\theta = 1$. The concentration is assumed equal to

 $\Psi_{o} = \Psi_{c} \sin^{2} \theta + \Psi_{p} \cos^{2} \theta$ (3)

A preliminary verification study reportedly supports this assumption. Hiway:

This model developed by Zimmerman and Thompson (1974) and based on Turner's (1970) work is the Environmental Protection Agency's model. The calculational procedure is centered around a numerical integration of the Gaussian plume point source equation for a finite length.

The predictive equation used by Zimmerman and Thompson for stable conditions is expressed in the form

 $\Psi_{\rm H} = u(\Psi_{\rm p}) \tag{4}$

For the unstable or neutral cases, if σ is greater than 1.6 times the mixing height, L, the concentration below the mixing height is independent of height and is given by

$$\Psi_{\rm H} = \frac{1}{(2\pi)^{1/2} \sigma_{\rm v} L} \exp \left[-\frac{1}{2} \left(\frac{y}{\sigma_{\rm y}} \right)^2 \right]$$
(5)

For other unstable or neutral conditions, Hiway uses a form suggested by Bierly and Hewson (1962) which accounts for plume trapping

$$\Psi_{\rm H} = \frac{1}{2 \sigma_{\rm y} \sigma_{\rm z}} \exp\left[-\frac{1}{2} \left(\frac{y}{\sigma_{\rm y} 2}\right)^2\right] \left(\exp\left[-\frac{1}{2} \left(\frac{z-h}{\sigma_{\rm z}}\right)^2\right] + \exp\left[-\frac{1}{2} \left(\frac{z-h-2n^{\rm L}}{\sigma_{\rm z}}\right)^2\right] + \exp\left[-\frac{1}{2} \left(\frac{z-h-2n^{\rm L}}{\sigma_{\rm z}}\right)^2\right] + \exp\left[-\frac{1}{2} \left(\frac{z-h-2n^{\rm L}}{\sigma_{\rm z}}\right)^2\right] + \exp\left[-\frac{1}{2} \left(\frac{z-h+2n^{\rm L}}{\sigma_{\rm z}}\right)^2\right] + \exp\left[-\frac{1$$

-Figure 6 shows an overhead view of the geometry of an at-grade section of roadway as seen by the model. The line sources are shown as dashed lines in each lane with the source length specified by (R_1, S_1) and (R_2, S_2) and a receptor location designated by (R_K, S_K) . As can be concluded by Figure 7, for a given receptor at (R_K, S_K) and a point (R, S), x downwind distance, and y croswind distance are given by

$$x = (S - S_K)\cos\theta + (R - R_K)\sin\theta$$
(7)

$$y = (S - S_K)\sin\theta + (R - R_K)\cos\theta$$
(8)

respectively.

Ψ

Noting that x and y are implicit functions of l, where l is the source path, the concentration can be found by integration

$$= \frac{Q'}{u} \int_{0}^{\overline{AB}} \Psi_{H} d\ell$$
(9)



FIGURE 6, OVERHEAD VIEW OF AT-GRADE SITE AS SEEN BY HIWAY MODEL (from Zimmerman and Thompson (1974)).



FIGURE 7, COORDINATE SYSTEM USED BY HIWAY MODEL (from Zimmerman and Thompson (1974)).

where the upper limit of integration is the source length (see Figure 7). This model employs a trapezoidal approximation for the numerical integration.

The dispersion coefficients used in this model are obtained from Pasquill-Gifford curves. To obtain estimates for the dispersion coefficients where a downward distance is less than 0.1 kilometers, an extrapolation of the existing curves is used.

Airpol-4:

This model, developed by Carpenter and Clemena (1975), also uses a Gaussian type of formulation. Although this model predicts both upwind and downwind concentrations, only the latter will be considered here.

Airpol-4 is unique in that it uses two Euclidean coordinate systems, the receptor and roadway coordinate systems. These are illustrated in Figure 8. The method employed calls for the mapping of the roadway coordinate system onto the receptor coordinate system. The transformation

 $T: (o,r,h) \xrightarrow{\text{roadway}} (p,dist,z)$ (10)

is performed by the use of

$$p = -d(\cos\theta) + r(\cos\theta)$$

dist = d(sin\theta) + r(cosθ) (11)
z = h

The authors of this model point out that this transformation is advantageous since it allows the equation to be integrated over all roadway points contributing to the pollution at a particular point.

$$\Psi(\mathbf{x},\mathbf{y},\mathbf{z},\mathbf{h}) = \frac{Q}{2\pi\sigma_{\mathbf{y}}\sigma_{\mathbf{z}}\mathbf{u}} \exp\left[-\frac{1}{2}\left(\frac{\mathbf{y}}{\sigma_{\mathbf{y}}}\right)^{2}\right] \left(\exp\left[-\frac{1}{2}\left(\frac{\mathbf{z}-\mathbf{h}}{\sigma_{\mathbf{z}}}\right)^{2}\right] + \exp\left[-\frac{1}{2}\left(\frac{\mathbf{z}+\mathbf{h}}{\sigma_{\mathbf{z}}}\right)^{2}\right]\right)$$
(12)



Since the Pasquill-Gifford σ_y are based on sampling times of 3 to 10 minutes, the effect of horizontal micro-wind variations are ignored. Following Turner's (1970) suggestions, the authors of Airpol-4 developed a method to adjust the Pasquill-Gifford σ_y values. This was done through the use of a power law relationship

$$\frac{(\sigma_y)_{t2}}{(\sigma_y)_{t1}} = (\frac{t_2}{t_1})^{\mathrm{P}}$$

t = time

where the exponent p is a function of stability.

Carpenter and Clemena (1975) also solve the mathematical difficulty presented when a dispersion function is expressed as

$$\Psi \propto 1/u \tag{14}$$

(13)

(15)

It is clear that as the wind speed approaches 0, Ψ approaches infinity. Airpol-4 uses

 $\Psi \propto 1/(u + 1.29 \cdot exp (-0.22 \cdot u))$

which is bound by finite limits and therefore is not subject to the difficulty presented above.

Now, using the above information, the problem of predicting the concentration is reduced to evaluating

$$\Psi = \frac{Q'}{2\pi u} \int_{M}^{UL} \left\{ \frac{\exp\left[-\frac{1}{2} \left(\frac{y}{\sigma_{y}}\right)^{2}\right]}{\sigma_{y}} \right\}$$
(16)
$$- \frac{\exp\left[-\frac{1}{2} \left(\frac{z-h}{\sigma_{z}}\right)^{2}\right] + \exp\left[-\frac{1}{2} \left(\frac{z+h}{\sigma_{z}}\right)^{2}\right]}{\sigma_{z}} \right\} dr$$

where (note: see Figure 8)

UL = the distance roadway extends in a straight line upwind from the
 point (0,0,h)
 roadway

M' = distance between intersections of R and P axes and (0,0,h) roadway

$$M = \max(M', -DL)$$

Since numerical integration of the above equation with a digital computer is costly, a mathematical technique is used in evaluating the integrand. The authors of Airpol-4 found that, in the neighborhood of $\theta \approx 90^{\circ}$, the integrand behaves much like

$$g(r) = a e^{-(ar)^2}$$
 (17)

where r is defined in Figure 8, and

$$a \approx (\sigma_{y} + \sigma_{z})$$
(18)

In the neighborhood of $\theta \approx 0$; the integrand behaves much like

$$h(\mathbf{r}) = \frac{e^{-\left(\frac{a}{r}\right)^2}}{r}$$
(19)

By using the above reproductive models of the integrand, the computation time is greatly reduced.

EMP-1:

This is an empirical model developed by Noll, Miller, Raney, and May (1975). This model was derived through a dimensional analysis of the form

$$\Psi = \frac{kQ}{u'(x/\sin\theta)^{a}}$$
(20)

where

x = downwind distance

k & a = empirical coefficients

u' = component of mean wind velocity normal to

road

By performing a regression analysis on $ln(\Psi u'/Q)$ versus $ln(x/\sin\theta)$ Noll obtained values for the constants in the above equation. The calibrated equation is

$$r = \frac{8.18 \text{ Q'}}{u'(x/\sin\theta)^{1.106}}$$
(21)

Model Validation:

The above models were all initially calibrated by their developers, with limited data. This calibration was performed through the use of a calibration coefficient in the predictive equation or by calibrating the dispersion coefficients. With the calibration performed, these models were tested for accuracy against the same data that were used in the calibration. In doing this, one may expect good results because the same data were used to "fit" the model as were used to validate it. A test of these models with independent data sets is needed before the validity of each model may be determined.

Upon reviewing the above models, it is apparent that many assumptions concerning micrometeorological parameters have been made. Furthermore, it seems that the validation of these models is inconclusive. In view of this, a model which takes into account meteorological phenomena and is also validated with several independent sets of data is presented.

Development of Improved Model

As can be seen from a review of the attempts to model pollutant dispersion from roadways discussed in the previous section, the major assumptions in the models are:

- Gaussion distribution of pollutants in both horizontal and vertical planes.
- 2.) Both horizontal and vertical dispersions are functions of stability and downwind distance traveled from the source and not a function of height.
- 3). Diffusion is independent of site topography.
- 4). Wind speed is constant with height.

The main difference in the models discussed in the previous section is in the methods used to obtain values for the dispersion coefficients. These assumptions result in diffusion equations which are easily solved and require simple input information. Table 4 summarizes the dispersion coefficants used by each model.

To remove the last three of the above restrictions which are known to be in error, a more general solution to the diffusion equation was found, i.e.

$$\Psi (X_{o}, Z) = \frac{Q'r}{u_{1}\Gamma(s)} \left(\frac{u_{1}}{r^{2}K_{1}x_{D}}\right)^{2} \exp\left[\frac{-u_{2}Z^{r}}{r^{2}K_{1}K_{o}}\right]$$
(22)

where

 $r = \alpha - \beta + 2 > 0$ $s = (\alpha + 1)/r$ $\alpha = \text{function of wind profile}$ $\beta = \text{function of stability}$ $\Gamma(s) = \text{Gamma function of s}$ $x_{\alpha} = x + x_{1}$

K₁ = eddy diffusivity at reference height of lm u₁ = reference wind velocity at lm x_o = downwind distance from virtual origin Z₁ = reference height = lm

This equation as used here is valid only for the reference height $Z_1 = 1 m$. The virtual origin concept is used when an initial dispersion of pollutants is assumed and is shown in Figure 5. The virtual origin is a hypothetical source that would produce a plume having a width equal to that of the source at its location.

Thus equation 22 allows for 1) the variation of the mean wind speed in the vertical direction, and 2) variations in surface roughness and variations in atmospheric stability. However, sensitivity analysis run on the model showed that variation in atmospheric stability had negligible effect on the predicted concentrations. Therefore, the stability variation was dropped from the model.

The well known logarithmic velocity profile

$$u(z) = \frac{u_{\star}}{k} \quad \ln(z/z_0)$$
 (23)

where

u_{*} = friction velocity
z₀ = surface roughness parameter
k = von Karmons constant

was used to describe the velocity in the model. The surface roughness parameter can be calculated from

> $z_{o} = 0.15 h_{c}$ (24) where

h_c = mean height of actual surface roughness elements The friction velocity may be calculated from a measurement of the actual wind velocity at a one meter height for a particular site

$$u_{*} = \frac{0.4 \ u_{1}}{\ln \ (z_{1}/z_{0})}$$
(25)



Figure 5 Virtual Origin Concept

where u_1 is the measured velocity at height z_1 . In the calculational procedure for the model, the virtual origin distance is found by minimizing the function

 $G(x') = \sum_{i=1}^{4} (\Psi_i - x_i)^2$ (26)

where

 Ψ = concentration calculated by equation 24

 χ = concentration at downwind edge of roadway

x' = distance of virtual origin from downwind roadway edge.

The summation is performed over the profile at the edge of the road (at heights of 5,10,15, and 20 feet). Since the 5-foot concentration is of more interest, the minimization at the 5-foot level is weighted more heavily than the others.

A predictive equation for the concentrations at the downwind edge of the roadway was found in much the same manner as Noll, Miller, Rainey, and May (1975) found EMP-1. By performing a dimensional analysis on the independent variables involved, the following equation was obtained,

$$= \frac{\Lambda Q'}{u \cdot \sin \theta \cdot 0.5v}$$

(27)

where

 Λ = empirical calibration coefficient w = width of roadway

Calder (1973) has shown that the pollutant concentrations at any given point perpendicular to the roadway are virtually independent of the wind angle. Hence equation (27) reduces to

44

 $x = \frac{\Lambda Q'}{u \cdot 0.5w}$

(28)

which agrees with the form presented by Pasquill (1974) for the algebraic integration for an area source.

Using carbon monoxide data provided by Miller (Dr. Terry Miller, Enviromeasure Inc., Knoxville, Tennessee), regression analyses were performed. This was done with SAS, a computerized library of statistical subroutines designed by Barr and Goodnight (1972). The analysis was performed on both

(29)

(30)

χ versus
$$\frac{20'}{u \cdot sin \theta \cdot w}$$

and

$$\chi$$
 versus $\frac{20'}{u \cdot w}$

where

 χ = roadside concentration at 5-foot height

TABLE 4. Summary of Regression Analysis of Roadside CO Concentrations

Regression Performed	Wind Speed	Coefficient of Determination	Constants
χ vs. $\frac{2Q'}{u \cdot \sin \theta \cdot w}$	> .54 m/s	0.13	0.44
χ vs $\frac{2Q'}{u \cdot w}$	> .54 m/s	0.85	6.87

Through a preliminary graphical analysis of the concentration profiles at the edge of the roadway, the profile was found to be an exponential function of height, namely

$$\chi(z) = \chi_{*} \exp (a_{0} + a_{1}z)$$
 (31)

where

 $\chi_* = \text{concentration at 5-foot level calculated with}$ equation (28) $a_0, a_1 = \text{empirical constants}$

Performing a regression analysis on $\ln(\frac{\chi(z)}{\chi})$ versus z yielded values of 0.1478 and -0.1211 for a_0 and a_1 , respectively. For this regression a coefficient of determination of 0.17 was obtained. This low value was obtained because of the large scatter in the data. It should also be noted that this regression was performed with limited data. The minimization of equation (26) is now readily performed and a value for x' obtained.

The lowest wind velocity in the data used to calibrate the model was 0.54 meters per second. Thus, the minimum wind speed the model will accept is 0.54 meters per second. By setting this limit the model will not be applied beyond the range for which it is known to be valid. This limit also eliminates the problem of the asymptotic infinite behavior of equation (28) at very small wind speeds.

Once the virtual orgin has been located, the profiles downwind of the roadway are calculated from equation (22).

The current model was called "TRAPS" for Texas Roadway Air Pollution Simulator.

Chapter 6

Discussion of Results

The results presented here are of an interim nature and are not complete. They primarily represent the work progress as of August 1, 1976. The discussion will be divided into two sections consisting of the experimental data collection program and the model analysis and development.

Discussion of Experimental Data Collection Program

Experimental data have been collected for eight days at the North Loop Site in Houston. The data in their original are stored on nine track magnetic tape which is compatible with most computers. The data are collected on an almost continuous basis. A computer program has been developed which will assemble the data into averages of any desired length. A sample of the results are shown in Tables 6, 7, 8, 9, 10 and 11. These represent 5-minute, 15-minute and one hour averages for two one hour intervals.

The first one hour interval shown in Tables 6, 7, and 8 is typical of the usually good dispersion of the pollutants from the roadway. However, the second one hour interval shown in Tables 9, 10, and 11 is representative of an unusual condition. At approximately 16:15 hours on May 4, 1976, the wind profile "inverted". As can be seen in the tables, the highest windspeed was at ground level. This wind inversion lasted less than ten minutes, but during this period the carbon monoxide levels increased by 50 percent. The carbon monoxide concentration was still increasing when the inversion "broke".

This inverted wind condition has not been considered in any dispersion model to date. Furthermore, this condition also exemplifies the problem involved in

using models that work on one hour averaged data. In ten minutes, a condition occurred from start to finish and the carbon monoxide response was not proportional to the condition change. The averaging models are all based on the assumption that the change in carbon monoxide concentration is proportional to the change in any parameter, assuming that the others hold constant. These data unfortunately show that this assumption is not always true and that dispersion from roadways is a very complex process.

The data collection equipment is currently set up at the Katy Freeway site and is ready to begin data collection. Present plans are to move back to the North Loop site by the first part of September, 1976 and then to Dallas and San Antonio. The original proposal called for data collection in Austin. However, no suitable site to set up the equipment could be found. It is also planned to move the equipment to El Paso in the spring or summer of 1977.

Discussion of Dispersion Model Analysis and Development

In determining the validity of any dispersion model, the accuracy of the data being used must be considered. Five sets of data were used in the analysis. These data sets were Noll, Miller, Rainey, and May (1975), Noll (1973), Carpenter, Clemena, and Lunglhofer (1975), Habegger et al. (1974) and Ranzieri (1975). These sets were discussed in Chapter 5. The current model along with CALINE -2, HIWAY and AIRPOL -4 which were discussed in Chapter 5, were compared to the data. As mentioned previously, both these models and the data are based on one hour averages.

The overall results of the comparison of these models to each data set are shown in Figures 9 through 13. These comparisons are for all of the data from a particular site and are summary comparisons. These results show that with the

modifications used in the present model greatly improved results are obtained. Detailed comparisons of the results can be found in Maldonado's (1976) work and will be included in the final project report.

Model improvement work is continuing. The data from the current research program can be used for development of models based on other than one hour averages. Comparison of the various models with the experimental data from the current program is underway and has not been sufficiently completed to include in this report.

Summary

The experimental data collection program is well underway and several days data has been collected at the North Loop site in Houston. The equipment is also ready to begin data collection at the Katy Freeway Site in Houston. In addition, dispersion model analysis and development is well underway and greatly improved results have already been obtained.







FIGURE ||. REGRESSION LINES OF MODELS FOR VIRGINIA DATA.



FIGURE 12. REGRESSION LINES OF MODELS FOR ILLINOIS DATA.



TABLE 5

Data Locations

(RADO)	(RAD1)	(RAD2)	(RAD3)	(RAD4)	(RAD5)	(RAD6)	(RAD7)	(RAD10)	(RAD11)	(TOTAL)					
CARS	VA40m	HA40m	WV40m	TMP30m PYRAN											
VANS	VA20m	HA20m	WV20m	TMP 20m											
MED TRCKS	VA10m	HA10m	WV10m	TMP10m RH30m											
HVY TRCKS	VA1.5r	n HA1.9	5m WV1	.5m TMP1.5m RH1.	5m										
CAL			С04н												
TOTAL				C04L											
	TOTAL	EASTBO	UND				TOTAL	WESTBOU	ND		C01H	С02н	СОЗН	С05Н	
				GRA	ND TOTA	L					C01L	C02L	CO3L	C05L	

55

С06н

C06L

ę

TABLE 6

													•				
				5	MINUT	E AVER	AGE AT	14:55		FI	LE: M	AY 4,19	76 ATGRADE				
*		21	61	0	46	16	13	66	8	45	0	276	1.68	****	216.30	75.21	734.2
		70.4	60.4	0.0	53+4	28.2	45.1	53+0	54.9	53•1	0.0	54.3	13.943	*****	18.028	0,843	54,9340
				~	7		2	10	c		•	65	0.77	10.60	166. 77	76.79	
		70.7	14	0							~ ~	. 00	903r 10.000	10.900	100.33	70.000	
		(2+)	64 • 1	UeU	200 (ာလစ ဘ	2001	0040	CO 8.4	0300	Ue U	0140	120009	4e 44 4	579 C 1 1	6.909	
	•	E		•	h	2	0	•		h	0	10	1.73	6.03	133.88	76.69	36.20
		71 0	67.3	0.0	50.6	0.0	0.0	=0. =	0.0	57.0	0.0	63.1	11.079	3.527	19-651	0.579	0.364
		1100	0342	0.00	3780		0.0	0940	.0+0	57.0		0001	******	30321	19000.		
		Ţ	2	0	2	1	. 3	9	0	2	1	23	-1.16	9.27	284.91	80.06	37.77
		66.5	52.2	0.0	73.4	42.3	60.0	58.8	0.0	58.3	76.9	61.5	5.643	2.018	26.221	0.352	9 . 441
		0000		•••					••••								
		0	0	0	0	Ó.	. 1	0	0	0	. 0	1			2:34		
		0.0	0.0	0.0	0.0	0.0	55. 9	0.0	0.0	0.0	0 • Ó	55.9			0.5358		
		46	82	0	55	20	18	88	14	59	1				2.25		
		71+1	61.2	0.0	54.9	30.1	48.8	54 ₈ 7	55•1	53.6	76.9				0,3680		
														• • •	• • • •	• • •	
******				203					180				1.654	0.6606	0.7669	0.3560	
****				58.7					230.8				089124	C 0 C 9 C 9 C	0.0000	092000	
						-	207						3.38	2.48	2.06	1.81	
-0.04						54	5-0						1.6791	1.3062	0.5915	0.6298	
0.3000					•												
																	· .
				·													
												•					
				5	MINUT	E AVER	RAGE AT	15:0	н на селото	FI	LE: N	AY 4,19	976 ATGRADE				
		21	43	0	39	19	6	45	10	33	0	215	-3.24	****	220,25	74,92	736.4
		68•6	61.3	0.0	53.3	29.0	44.9	5302	53.2	52.7	0.0	53.9	14,087	*****	9 . 870	0.731	34.6554
				1			· ·	· .	_	-				• • • • •		76 06	
		14	. 11	0	3	0	1	8	2	5	0	44	÷/•56	14.25	2/1040	10020	
		74.0	61.4	0.0	57.7	0.0	51.5	61.9	స్.నం న	54.0	0.00	0349	14.842	20990	296710	04704	
			-	•	0				•	0	0	10	0.82	12.97	139.12	76.50	39.19
		3		0.0	0.0	0.0	52. O	<u>د</u> جج م	58.4	0.0	0.0	60.7	12.641	3.715	16.963	0.834	0.397
		09.00	2003	0.0		0.0	560 5	0040	0004								
		2	4	. 0	2	0	1	10	0	1	0	20	-0.98	9.78	291.01	79.72	37:36
		70.1	60.1	0.0	59.8	0.0	55.4	62.7	0.0	54.6	0.0	61.8	6.595	3.063	31.027	0.829	0.313
		. 0	0	0	0	о	0	Q	0	0	0	О			1.84		
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.4211		
		40	61	0	44	19	9	65	13	39	0				1,82		
		70.7	61.1	0.0	53•9	29+0	47.7	55+8	53.6	53.0	0.0				0.3109		
															• • • •	o 47	
*****				164					126				0,85	0 5 44	0. 2020	U\$43 0.04/7	
******				57,8					54•1				0.3306	0000403	46 39 39	0.002447	
														2 2 4	2.10	1.60	
0.06						_	290						2043 0- 661 A	A.0014	0.8475	0.5982	
0.2551						5	0.2						00014	~~ > > 1 3	590470	5 - C / GE	

56

TABLE 6 (continued)

				- 5	MINUT	TE AVER	RAGE AT	15: 5	5	F		44Y 4,19	976 ATGRADE				
		34	64	0	72	21	3	48	9	33	0	284	0.52	****	211.85	74.14	773.4
		71.3	60•9	0.0	54.8	26.7	51.7	54+2	52.4	52.4	0.0	55.6	14.908	*****	17.355	0.736	25.6125
									- 19 19								· · · · · · · · · · · · · · ·
		21	15	0.	11	0	5	7	6	5	0	70	-3.13	13.32	159.71	75.34	
		72 • 0	60,6	0.0	60+1	0.0	57.3	61+2	54.2	53.9	0.0	62.8	17: 330	1.994	28.844	0.634	
		6	6	0	1	1	2	10	1	2	0	29	2.26	12.31	129.44	75.91	38.55
		70•4	59.8	00	58.2	38.6	58.4	63.5	57.0	47.7	0.0	61.5	13.072	2.519	23.673	0.265	C.348
	1997 - A.	•															
		3	9	0	1 (J. 1	3	6	6	0	5	0	33	0.49	10.01	278.16	79,39	36,62
		78•4	62÷0	0.0	47.6	47.2	61.3	66.9	0.0	59+2	0.0	62.0	6.346	3.558	32+660	0.743	0.375
		0	0	0	0	0	1	Ó	0	C	0	1			1.83		
		0.0		0.0	0 • 0	0.0	61.7	0.0	0.0	0+0	0.0	61.7			0.4705		
. · · · · ·			_ .	_													
		64	. 94	0	85	25	15	71	16	45	0				1.98		
•		11.8	60 . 9	0.0	55+4	29.6	58.0	57.3	53+4	53+1	0.0				0.5058		
بالد بالد بالد بالد بالد بالد				040				~									
******				258					148				0.89	0.79	0.88	0•48	
*****				2646					55+7				0.3253	0.7752	0.5440	0. 3696	
0.16			1997 - A														
0.5010							7.77 1.10						3.21	2.77	2.50	2.23	
00.0019						57	• •						1.2203	1.6120	1.1080	1.0334	
	1																
				5	MTNUT	E AVED	ACE AT	15.10		51							
		25	. 61	,	۸7	19	1 4	51	0	20		1AI 4113 941	TO AIGRADE			77	710 0
		70 - 7	60.2	46.5	54.1	28.0	45.6	52.0	53.3	50.0	56.7	54-1	17 001	****		13695	740.00
			0002			2000	4090	5204	3369	20.09	00e /	0494 4	11001	******	110530	000/4	3190432
· •		. 8	8	0	3	2	0	16	٨	7	0	48		10.71	107.77	75 01	
		69.0	64.7	0.0	55.2	37.9	0.0	60.4	49.9	40.4	0.0	58.8	-5110	12431	103933	0-267	
		•				0.05		000	~ / • /	4 2 4 4			100110	+0203	238302	0.307	
		0	1	-0	0	. 0	· 2	2	1	4	0	10	-2-51	10-85	150-11	75-68	30. 23
• *		0.0	58.9	0.0	0.0	0.0	60.0	54.2	43.4	49.5	0.0	52.9	12.045	3.460	21.717	0.349	0.718
				•••		•••								36 - 00		0.000	00120
		2	3	0	1	1	. 1	10	1	7	1	27	-1.18	8.89	302.39	78.83	37.02
		72.7	63.6	0.0	57.1	50.5	55.0	66.8	42.6	53.3	58.7	60.8	5.752	3.541	33.486	0.852	0.691
																•••••	
		ò	0	0	0	0	0	0	0	0	0	0			1.83		
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			0.3037		
		35	73	1	51	21	17	79	15	52	2				1,94		
		70.5	60.8	46.5	54.2	30.0	47.9	55.9	51.0	50.9	57,7				0.4714		
•															-		
*****				181					165				0.74	0.34	0.40	0.54	•
******				57.2					53.1				0.2828	0.5125	0.5001	0.3433	
0.26						3	46						2.23	1.86	1.74	1.73	
0.4741						55	• 2'						0.4935	1.0054	0.5603	0.6120	

TABLE 6	(continued)	
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$\begin{array}{cccccccccccccccccccccccccccccccccccc$
68.5 59.3 0.0 55.1 28.4 44.4 53.3 52.7 50.5 0.0 53.5 16.921******* 17.121 0.882 12.70 15 7 0 1 5 1 10 13 0 62 1.92 10.77 181.77 76.00 70.3 63.9 0.0 52.5 42.1 47.3 63.3 59.0 53.6 0.0 60.2 15.829 3.847 24.971 0.818 4 2 0 1 3 0 4 1 0 16 -0.57 8.60 149.87 76.26 39.40 72.9 64.6 0.0 64.1 44.4 0.0 57.5 58.0 58.7 0.0 60.3 11.467 3.316 30.304 0.474 9.054
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
$\begin{array}{cccccccccccccccccccccccccccccccccccc$
70+3 63+9 0+0 52+5 42+1 47+3 63+3 59+0 53+6 0+0 60+2 15+829 3+847 24+971 0+818 4 2 0 1 3 0 4 1 1 0 16 -0+57 8+60 149+87 76+26 39+40 72+9 64+6 0+0 64+1 44+4 0+0 57+5 58+0 58+7 0+0 60+3 11+467 3+316 30+304 0+474 9+054
4 2 0 1 3 0 4 1 1 0 16 -0.57 8.60 149.87 76.26 39.40 72.9 64.6 0.0 64.1 44.4 0.0 57.5 58.0 58.7 0.0 60.3 11.467 3.316 30.304 0.474 0.054
72.9 64.6 0.0 64.1 44.4 0.0 57.5 58.0 58.7 0.0 60.3 11.467 3.316 30.304 0.474 0.054
69•7 61•3 0•0 0•0 43•4 61•9 64•9 50•3 57•6 0•0 61•2 6•994 2•133 43•189 0•347 0•246
52 70 0 63 34 18 89 22 55 0 1.74
69+4 60+1 0+0 55+2 32+2 48+5 56+2 55+6 52+2 0+0 0+6133.
****** 219 188 ****** 0.50 0.55 0.33
******* 56•6 54•1 ****** C•4876 0•6077 0*2970

			5	MINUT	E AVER	AGE AT	15:20	t	FI	LE: M	AY 4,19	76 ATGRADE			
	30	68	0	44	26	12	60	7	41	0	288	-1.04*****	* 238.57	74,35	699.6
н.	69.2	59.4	0.0	54.3	27•3	44.9	53+1	56.2	5 0 • 5	0.00	53.5	14.536*****	* 12.646	C.715	22.0964
	12	9	0	. 6	. 0	2	14	4	ç	0	56	-5.26 10.7	0 154,63	75:57	
	70.0	61.8	0.0	60 • 3	0+0	54 • 1	58.2	56.6	52.6	0•0	60.4	11.892 2.60	5 29.354	0,913	
	2	6	•	2	0	1	4	з	1	0	19	-0.36 10.5	3 124.18	76.18	39,43
	71+7	61+1	0.0	63.4	0.0	53+9	5608	51+5	51•4	0.0	59.1	11.384 3.31	1 17,323	0.643	0 • 703
	3	3	0	. 0	2	6	9	0	ε	0	31	0.41 9.7	3 276.18	80,18	37.09
	74.3	55.7	0.0	00	47•3	55.3	62.4	0.0	54.9	0.0	58.6	5.551 2.87	7 16,431	1.304	0.445
	0	0	0	. 0	0	1	1	0	0	c	2		2.49		
	0.0	0.0	0.0	0.0	0.0	63+4	6904	0.0	0.0	0.0	66.4		0.6056		
	47	86	0	52	28	21	87	14	59	o			1.85		
	69•9	59.6	0.0	55+4	28.8	49•2	55.0	55.3	51•4	0.0			0.4403		
•	. · · · ·		213					181				****	* 1.15	0.43	
			56,8					53•2				*****	* 0.7483	0,2519	
					3	3 94						* *** *******	* 3.03	2.36	
					55	5•1						******	* 0.9332	0.6394	

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***** **

***** ***** 0.27 0.2557

TABLE 6 (continued)

0•11 0•3339						4 56	€0 •5						3.28 1.3136 1.	2.73* 1952*	******	1.95 0.3910	
*****				262 58•7					198 53•5				1 •1 5**: 0 • 6202**:	*****	:*******	0.36 0.3213	
		70+2	60.4	0.0	54.6	3 <u>2</u> •3	52 . 8	56+5	53•4	50.0	0.0				1+45 0+4379	· ·	
		65	100	0	74		21	27	20	٤٨							
		1 83•7	0 0.0	0.0	0.0	0 0.0	2 .63•6	1 64•1	0 0•0	0.0	0.0	4 68•7			2,23 0,6975		
		73.4	ó4•5	0.0	58.9	44.7	60.2	64•6	51•1	52.1	0.0	61.5	5.741	2,366	23.633	0.242*****	×
		5	10	0	4	2	б	10	2	5	0	44	0.49	9.86	278.19	79=02*****	*
		74.0	ь 63•8	0.0	1 60°•2	3 45•9	1 62.7	4 61•2	2 58•4	2 47•4	0.0	22 60 .1	0.06 10.277	11.10 2.537	129.50*	**********	*
		-	e			_							12000		200 F / O*	n na na ing na	
		21 69•2	13 60•2	0.0	0.0	3 38.9	3 61.3	10 59.6	10 53•0	5 50•2	0. 0.0	65 60 • 2	-4.24	11.37	162.064	*****	
		70+0	59.6	0.0	54.3	26, 6	45•6	54.3	53.2	49.5	0.0	54.9	14.364**	****	18,461*	*******	* **
		36	71	0	69	15	11	59	16	52	o	329	-0.73**	****	215.37*	***	* * *
		•		5	MINUT	E AVER	AGE AT	15:30		113		AY A 107	6 ATCRADE				
						•											
				•			*								10 2000		
0.2867					•	55	101 5+8						3•19** 1•3603**	*****	2.24	1.89 0.7284	
0-09										• • •				->- Tr Tr -A	0.0022	V. C310	
*****				229 56•5					172			·	1.27**	*****	0.86	0.25	
						248.0	5444	90 94	00%9	3203	0.0				0.4913		
		52 70-6	91 60•7 ·	0	- 49 53.2	37 30 - 9	16 54 - 4	85 [.]	18	53	0				1.67		
		. U ⊕ U.	Ve V .	U• 0.	0.0	0.0	0.0	50.8	0.0	0.0	0.0	60•8			0.3329		
	• •	0	0	0	0	0	0	1	0	Ó	0	1			2.21		
		814	67•5	0.0	0.0	43.0	55+9	65.0	53.8	*54∙3	0.0	60•4	4.428	2.075	18.892	*****	*
÷		4	2	0	0	З	5	8	2	8	0	32	0.59	10.31	271.02	****	*
		70.9	55.0	0.0	62.6	0.0	56.6	60•2	58.9	50.6	0.0	59.8	10.820	2.525	16.068	****	*
		4	3	0	1	0	2	8	1	Ĵ	0	22	-0.29	11.04	117.17	*****	<u></u>
and and a second se		70 • 1	62.0	0.0	60.3	40.0	57.1	59.6	58.2	50.5	.0.0	59,3	-1.84 12.589	11.33 2.846	147.C8 31.977	*****	
•		. 13	11	0	Ż	5	2		Л	0	~	# 6	• • •				4 4
		69.4	60.6	0.0	52.7	28•0	51•9	50.9	55.0	34 52•3	0.60	291 · 54•3	~1•62** 14•898**	*****	198.57	*****	***
		71	76	່ຣ	MINU	TE AVE	RAGE AT	15:25	5	FI	LE: M	AY 4.197	6 ATGRADE				

							•	TABL	Еб (с	contin	ued)					
			ę	S MINUT	TE AVER	RAGE AT	15:35	5	FI	LE: N	4AY 4,19	76 ATGRADE				
4	28	74	0	60	29	16	58	8	37	0	310	0.51	*****	225,89	74.45	715.8
	69.6	59 • 5	0.0	53.4	27.4	44.9	52.8	54•8	52.6	0.0	53.3	14.351	*****	15,370	0.843	29.9792
•	26		~			~	-		-	•	<u>.</u>					
and the second sec	70.9	58-5	0.0	57.6	ت ۸ ۲۶۰	52.1	61.2	10	54.4	0	84 50 5	-1.14	11.61	177.03	75.94	
		3045	0.0	5/40	57 8 4	J 0 1	0102	2190	3464	0.0	2900	140725	4.185	10.913	0.835	
	1	5	0	1	1	1	4	4	6	0	23	-0.70	9.53	143.78	76.12	40.50
	67.1	60.9	0.0	55.3	41.3	55.6	61.7	54.4	51.6	0.0	56.4	12,633	2.911	23.276	0.553	0.165
			· .			د					•					
	8	11	0	3	3	6	15	1	10	0	57	0.33	7.62	284+30	79.55	37,93
	70.7	61.6	0.+ 0	49•4	41+9	57,9	62.7	58.7	54.5	0.0	59 . 8	5.497	2.993	31,464	0.329	0,244
	· •		•	0						•						
	0.0	0.0	0-0	0-0	00	59.9	1 60-3	0.0	0.0	0-0	50.1			2.68		
					0.0	J 7 9 7	0040		Vev	0.00	2001			100104		
	63	103	. 0	68	38	. 30	84	23	60	0				1.50		
	70.3	59.6	0+0	53.5	30.2	49.5	55.7	53.6	53.0	0.0				0.5357		
										•			e.			
*****			277					197				1.46	-0.92	5.48*	*****	
****			50+5					53.7		·		1.7117	1.7308	10.5992*	*****	
. 0.00					4	74						2.37	3. 95	6.08*	****	
0,1903					55	5.3						2.6746	2.1948	8.7138*	*****	
													•			
			-		F AVES		15:40		FT	15: 8	AAV 4.10	76 ATCRADE				
	33	75	0	76	36	15	59	10	34	0	338	0.812	*****	221.67	74,89	672.4
1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 - 1997 -	69.2	59.6	0.0	54•8	27.6	43.1	53.3	50.6	52.9	0.0	53.3	17.479	******	11.681	• 922	15,1822
	19	21	C	4	1	4	12	12	11	0	84	-3.12	11.35	175.58	76,23	
	69.2	60.7	0.0	60 . 5	37.9	53 • 7	58.2	54.5	53.6	0.0	59.8	16.146	3.404	19.309	0.648	
	4	7	•	•	•	-		· _	٨	•	77		10 70	140.07	76 64	40 50
	64.4	63.6	0.0	0.0	0.0	51.6	60.3	52.1	51.3	0-0	58.0	13,500	2.511	142003	10+524	40.659
	- · • ·		•••			0.00	0000	0201	5		00.0			100040	69 C 4 7	03420
	15	8	0	. 0	1	6	13	0	9	0	52	0.65	8.64	280.30	80.11	37.91
	71 • 1	60.9	0.0	00	49.8	55 • 1	62.0	0.0	58.6	0.0	62 . 8	5.456	2.728	31.054	0,521	0,379
		•		-	-			-	•	-						
	0.0		0.0	0.0	0.0	1 60.5	0-0	0.0	0-0	0.0	1			******		
	V. V	0.0		0.0	0.0	00.5	0.00	0.00	0.0	0.00	CO 8 D		-			
	73	111	0	80	38	28	85	28	58	0			*	*****		
	69.2	60.2	0.0	55.0	28.4	48.1	55.4	52.6	53.8	0.0			×	*****		
									•							
******			302					199			_	1.02	-1.20	0.74*	*****	
*****			57+0					5345			•	0.3487	U 7674	0.4515*	****	
0.02					ę	501						3.50	3.33	2.55*	****	
0.2189					55							1.1283	1.4758	0.8073*	*****	

		5	MINUT	E AVER	RAGE AT	15:45	5	FI	LE: N	AY 4.19	76 ATGRADE				
47	74	0	66	31	19	65	17	47	0	366	2.10	******	220.50	74.15	607 0
68.8	60.6	0.0	52+8	28.8	45.9	52.5	53.4	50.9	0.0	53.8	13.016	*****	12.392	0.566	30.7571
24	21	0	6	з	2	12	21	8	0	97	-0-35	10.92	175.76	75 60	
69.0	59 , 7	0.0	57.0	38•8	48.2	61+3	54.8	49.7	0.0	59.3	17.223	2.055	27.282	0.497	
4	2	0	4	2	1	4	6	2	. 0	25	1014	9.99	139.72	76.20	40 50
71.3	61.0	0.0	55.0	38.2	57•8	61.7	57•3	53. 0	0.0	59.1	13.537	2.326	21.259	0.339	40.02
9	12	0	4	7	5	з	1	8	0	49	0.47	8.05	283.00	84.30	37 40
74+1	64.0	0.0	58.0	41.6	54 • 0	64•2	58.5	57.8	0.0	60.1	6.153	1.871	27.775	0.368	0+325
1	0	c	0	o	. 0	٥	0	o	0	1		*	*****		
70.0	0.0	0.0	0.0	0.0	0.0	0.0	0•0	0.0	0.0	70.0		*	*****		
84	109	o	80	43	27	84	45	65	. 0			*	*****		
69•6	60.8	0.0	53 <u>•</u> 5	32.0	48.0	54.6	54.7	52.0	Ŭ ⇔ O	•		*	****		
		316					221				1.24	-0-71	0.00	0 77	
		57.4					53.0				0.4501	0.5199	0.6004	0.2369	
				Ś	37		1. 				4.42	4.26	7. 05	2 1 5	
				55	• 6						1.9174	2.1508	0.8720	2015 0.4581	
	47 68.8 24 69.0 4 71.3 9 74.1 1 70.0 84 69.6	$\begin{array}{cccccccccccccccccccccccccccccccccccc$													

TABLE 6 (continued)

5 MINUTE AVERAGE AT 15:50 FILE: MAY 4,1976 ATGRADE 44 83 0 77 21 11 49 17 41 0 343 -0.96***** 218.54 75.37 661.0 69.5 59.5 0.0 53.4 28.3 43.8 53.8 55.9 51.3 0.0 55.0 12.535****** 15.482 0.931 25.2587 24 21 0 5 0 2 12 14 13 0 91 -1.03 10.09 167.94 76.25 70.4 61.4 0.0 62.5 0.0 60.1 60.2 58+8 50.4 0.0 61.7 16.148 2.819 23.717 0.890 2 4 Ô. 1 С 5 0 2 З 0. 17 -0.43 9.85 131.32 76.34 41.35 76.0 60.5 0.0 57.8 0.0 0.0 64.9 59.1 52.2 0.0 61.8 14.117 2.606 19.232 0.510 0.283 10 6 0 З 4 9 19 2 8 0 61 9.02 275.10 79.66 38.46 0.46 58.2 46.7 61.1 64.3 59.2 55.7 74.8 63.9 0.0 0.0 62.8 5.847 2.677 24.753 0.385 0.428 0 0 0 0 0 2 0 0 0 0 2 ****** 0.0 0.0 0.0 0.0 0.0 63.8 0.0 0.0 0.0 0.0 63.8 ***** 80 114 0 86 25 22 85 35 65 0 2.38 0.0 54.2 31.2 52.4 57.7 70.6 60.1 57.4 51.7 0.0 0.3064 305 207 1.75 -0.81 0.71 0.42 58.8 55.2 0.6933 0.5825 0.6980 0.2541 512 4.16 3.74 2.54 1.78 57.4 1.1246 1.3198 1.3404 0.7290

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-0.11

0.3667

0.19

							, I	ABLE (6 (con	tinue	1)	•				
			5	MINU	TE AVE	RAGE AT	15:5	5	FI		4AY 4.19	76 ATGRADE				
	44	75	0	66	21	10	48	19	38	0	321	-2.95	*****	208.00	75.55	. 535.6
· · ·	70.0	59.3	0.0	53.9	30.6	47.9	52,3	52.1	51.1	0+0	55.0	12.396	*****	13.964	0.657	58.4294
	25	15	c		7	2	-									
	71.3	60.8	0.0	56.8	42.0	52.2	52.8	55.0	52.0	0.0	84	-4.32	9.75	159,23	76.52	
							0240	55.0		0.0	00.00	11.209	3.123	.31,793	0+233	
	5	5	Ö	1	1	1	6	7	4	C	30	-0.83	9.60	129.57	77,00	40.53
	71.0	63.5	0.0	59 • 5	46.9	52.5	<u>,</u> 60∙ 5	52.0	57.0	0.0	59.6	13.531	3.058	20,563	0.349	0.652
	10	10	•	2	•			_	_	_						
	72.2	65.8	0.0	65.0	44.2	57.5	67.6	5	57.5	0	59	-0.20	8.03	270,60	79,85	37.98
			••••	0000		57.00		50.00	9300		0201	5.634	1.837	21.3340	0.697	0.631
	0	0	0	0	0	1	0	0	0	0	1			1.82		
•	0.0	0.0	0.0	0.0	0.0	59.1	0.0	0.0	0.0	0.0	59.1			0.7993		
									· .							
	70.7	-107	0	71	27	22	73	50	60	0				1.94		
		0005	0.0	2403	3345	52 • 4	55+9	53.2	51.9	0.0				0.4630		
****			289					205				1.57	-0.65	1 00	A 3 7	
****			59.4					53.7				0.8879	1.0261	0.8095	0.1859	
****					. 4	94						4.21	3,60	2.73	2,73	
······································					57	•0					•	1.5785	1,4984	0.7189	0.7801	
	4															
												·				
	·															
	, • • •		5	MINUT	E AVER	AGE AT	16: 0	1	FI	LE: M	AY 4,19	76 ATGRADE				
	43 69+3	59-7	0.0	/1	35	13	49	16	41	.0	351	-1.72	*****	214.34	74.25	712.8
	0900	J 90 I	0.0	0400	2982	40 <u>8</u> 4	53+0	2.300	50.8	0.0	53+9	12.420	****	13,187	0.748	31.6346
	17	11	0	5	. 1	3	12	24	4	0	77	-6.61	10.53	156.30	75.45	
	69.1	62.0	0.0	60.6	38.5	47.6	52.9	55.8	45.8	0.0	58.4	10.432	2.428	28.002	1.012	
	3	3	0	0	1	2	3	5	7	0	24	0.10	10.30	129,61	75+86	39.67
	0004	0100	0.0	0.0	40.5	4907	61.3	52.9	5 % ⊕ 9	0.0	56.8	10.391	2.378	18.411	0.753	0.358
	5	10	. 0	1	2	4	13	1	G	·	45	0.20	8.52	277 27	70 FF	77 14
	.67 • 5	64.5	0.0	56.3	49.6	55.7	55.1	55.0	54.3	0.0	58.3	5.523	2.330	20.203	0.505	3/014 Da180
	0	· 0	0	0.	.0	2	1	0	0	0	3			0.98		
	0.0	0.0	0.0	0.0	0+0	51 • 5	67.6	0.0	0.0	0.0	56.9			0.3632		
	68	107	0	77	39	22	77	46	61	n				1 = 1		
	69.0	60.4	0.0	54.7	30.9	47.9	53.7	54.5	51.5	0.0				10.3632		
										*				**		
****			291					206			-	1.17	*****	0.55	C.34	
******			57.0					52.6			•	0.6290	******	0.4579	9.3068	
0.15					Δ.	C7								.		
0.2414					55	•1						3870 1-0640	3:33	2:24	1+89	
						1.1							••••		~~~~~	

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15 MINUTE AVERAGE AT 14:45 FILE: MAY 4,1976 ATGRADE														
98	176	0	139	79	44	178	26	93	0	833	1	223.97	74.57	739.0
70 • 1	60.5	0.0.	54•4	28+1	45 • 1	55.2	52•9	48.7	0.0	54.0	15.993******	13.080	0.782	233.8044
43	36	o	15	12	14	16	14	21	o	1.71	-1.23 12.84	176.01	75.92	
68.9	61.7	0.0	57.5	38+6	55 - 9	62.3	58.4	55.8	. 0.0	69.1	14.615 4.147	24.155	0.637	
15	11	0	6	. 0	8	13	1	6	0	6 0	-0.08 10.76	144.49	76.32	40.68
68•7	61.6	0.0	58.4	0.0	59 . 5	62.5	52.6	54.1	0.0	62.1	13.588 3.733	23.342	0.500	0.744
13	24	0	10	7	21	24	2	21	0	122	0.56 8.40	289.49	79.49	38.70
76.5	60.0	0.0	57 . 9	45•3	58 . 7	64 . 5	53•7	56,8	0.0	60.8	6.550 2.386	30.204	0.691	0.747
0	0	o	. 0	0	3	1	0	0	0	·2		1.80		
0.0	0.0	0.0	0.0	0.0	66.4	68.7	0.0	0.0	0.0	67.5		0.4309		
169	247	o	170	98	87	231	43	141	0			2.33		*
70.2	60.7	0.0	55.0	30.6	51.5	57.1	54.7	51.2	0.0			0,4473		X
		684					502				1.18 0.61	0.71	0.35	* . · ·
		57.3					54.2				0.5839 0.5049	0.3870	0.2019	
				11	86					•	2.82 2.40	2.09	1.75	,
				56	• 0 •						0.8385 0.9412	0.7238	0.4401	

Ξ.,

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	15 MINUTE AVERAGE AT 15: 0								FILE: MAY 4,1976 ATGRADE							
	71	169	0	135	59	33	157	34	124	1	783	0.00	****	220.73	75.02	765.1
	69.2	60.5	0.0	53.8	28.6	·45•0	53.2	53•0	52.5	55.6	54.0	13.711:	****	16:351	0.713	57.8174
	43	39	0	10	. 4	6	28	14	17	0	161	-3-86	12.29	171.96	76-41	
	72.6	62.1	0.0	58.1	35.6	53 • 3	61.0	53.1	53.6	0.0	61.8	1 *• 055	4.056	26.905	0.747	
	13.	15	ò	5	2	1	8	2	5	1	52	0.46	11.11	138.99	76.65	39.56
,	68,7	60.5	0.0	58 °6	39•9	52.9	60•4	53.6	56.2	78.5	61 • 1	11.909	3.710	23 • 7 54	0.658	0.419
	8	13	· c	5	2	10	26	2	7	1	74	-0.49	9.04	291.14	80,06	37, 57
	70.7	61.9	0.0	66•1	41.4	60 • 2	62.1	60.3	59.3	76.9	62.3	6.013	2:593	30,952	0.579	0.345
	0	. 0	o	c	0	1	0	0 ^	0	0	1			2.01		•
	0.0	0.0	0.0	·0 • 0	0.0	55•9	0.0	0.0	0.0	0.0	55.09			0.5540		
	135	236	0	155	67	50	219	52	153	з				1.96		
	70+3	60.8	0.0	54 • 6	29•8	49.2	55.5	53.3	53.1	70.3				0.4032		
			593					477				1.09	0.65	0.69	0.36	
			57.9					53.9				0.7368	0.5618	0.4062	0 + 2901	
					10	70				e de la composition d	•	2.99	2.30	2.05	1.64	
					56	• 1						1.2482	1.0950	0.7003	0.6283	

TABLE 7

63

0.01

0.10 0.3159
								ጥለ ወተ	F7 (aantin	(bou						
				16		E AVE	ACE AT	TADL	ים אינים. נ	concin e 1			76 ATCOADE				
		90	180	1	180	64	30	162	27	105	ւտ	840	O-41	******	220.73	74.05	746.5
		70.2	60.1	46.5	54.7	27.7	45.7	53.3	52.8	51.2	56.7	54.4	16.505	*****	18.199	0.688	32.8133
		44	30	0	15	7	6	33	20	25	0	180	-2.10	12.13	175.17	75.52	
	· . ·	70.9	62.5	0.0	58 . 7	40.09	56.1	61.5	55•8	52•4	0.0	60.8	16.300	3.588	27.970	0.691	
			-		-				_								
		10	600	0	2	4	4	15	3	7	C C	55	-0.27	10.59	143.06	75.95	39.06
		₹1 ● 4	00.8	0.0	0102	420 9	59÷2	00.09	52,98	50+3	0.0	59.65	12:315	3.435	20.803	0.417	0.575
		7	18	0	2	5	11	23	٦	19	1	94	-0.07	8.46	296-85	79.24	36.96
		74.3	62.0	0.0	52.4	47.1	61.0	66.0	47.7	56.5	58.7	61.4	6.418	3.437	38.414	0.701	0.517
		0	0	0	0	e	2	0	0	1	0	3			1.88		
		0.0	0.0	0.0	0.0	0.0	61.7	0.00	0.0	43.4	0.0	57.3			0.4957		
		151	237	1	199	08	51	239	53	156	2				1.89		
		70.7	60.6	46.5	55 . 0	30 • 8	51+3	56.4	53.6	52.0	57.7				0.5259		
******				668					501				******	· A. 68	0.65	0.45	
*****				57.6					54.2				******	0.6347	0.5688	0.3380	
															•••••••		
0.16						11	69						******	2.28	2.13	1.92	
0.4241						56	5•2						******	1.2244	0.8226	0.7517	
																	· · · · ·
												-				•	
						TE AVE		15:30		F		AV 4.19	76 ATGRADE				
		97	214	0	159	70	30	177	34	127	, 0	908	-1.13	*****	2)7.45	******	*****
		69.6	59.9	0.0	53.9	27.5	45.8	53.8	54.4	50.7	0.0	54.3	14.508	******	16.645	****	******
							•										
		46	.33	0	8	8	7	35	18	22	0	177	-3.78	11.13	154.69	*****	
		69+7	61.2	0.0	60.3	39.6	58.0	59.0	55.0	51.3	0.0	60.0	12,385	2.445	30 • 359	*****	
				_					•								
		9	15	0	4	3	4	16	6	6	0	63	-0.20	10.89	123.55	*****	******
		7201	60.9	0.0	62.4	4369	5/04	2700	5540	4901	Us U	2401	106/90	2.119	12.960	*******	****
		12	15	0	4	7	17	27	4	21	o	107 .	0.50	9.95	275.10	79.58*	*****
		76.3	63.1	0.0	58.9	44.7	57.2	54.0	52.5	54.0	0.0	60.3	5.261	2.438	19.998	0.977*	*****
		1	. 0	0	0	0	3	3	0	0	0	7			2.31		
		83•7	0.0	0.0	0.0	0.* 0	63 o 5	64.8	Ò•0	0+0	0.0	66.9			0.5692		
			•					• =			-						
		164	277	0	175	88	58	255	62	176	0			5	1+65		
		70.2	60.3	0.0	54.5	30 . 6	51.9	56.0	54•5	51.2	0.0				0.4697		

.

*****	 704 57•4	551 53•8	1 • 05***********************************	** 0•35 ×* 0•2730
0.15 0.2956	1255 55•9		2.95************************************	** 2.08 ** 0.6209

			15	MINUT	E AVER	AGE AT	15:45	,	FI	LE: M	IAY 4+197	6 ATGRADE			
	108	223	0	202	96	50	182	35	118	0	1014	1 • 1 4****	* 222.70	74.50	592.
	69.1	59.9	0.0	53.7	27.9	44.7	52.9	52.9	52.0	0.0	53 . 5	14,980*****	* 13,362	0.802	30.963
	69	60	•	14	9	13	31	43	26	0	265	-1.53 11.3	0 176.14	75,95	
	69.8	59.7	0.0	58+2	37.9	52.0	60•1	54 . 0	52.6	0.0	59:5	15,998 3,28	9 21.611	9 . 685	
	11	14	o	5	3	5	. 9	16	12	0	75	0.85 16.0	9 141.83	76.29	40.54
	67•1	62.3	0.0	55 .1	39.2	53.8	61.5	54.6	53.4	0.0	57.9	13:256 2:60	0 20.522	0.518	0:293
	32	31	0	7	11	17	31	2	27	0	158	0.48 8.1	1 282.57	80.01	37377
	71+8	62.3	0+0	54.3	42.4	55.8	62.6	58.6	56.9	0.0	60.9	5.700 2.56	7 30.023	0.522	0.372
	1	0	0	0	0	2	1	0	o	0	4		*****		
	70.0	0.0	0.0	0.0	0.0	60•2	60.3	0.0	0.0	0.0	62.7		*****		
	220	328	0	228	119	85	253	96	183	0			*****		
	69.6	50 • 2	0,•0	54.0	30 • 3	48.6	55.2	53•8	52.9	0 • 0			******		
			895					617				1.24 -0.9	4 2.73	*****	
			57.0					53.4				1.0213 1.112	8 6.5032*	******	
					15	12						3.43 3.8	4 3.88*	******	
. •					55	5.5						2.1176 1.939	2 4.9469*	******	

15 MINUTE AVERAGE AT 16: 0 FILE: MAY 4,1976 ATGRADE 34 120 0 1015 -1.88****** 213.62 75.06 669.8 131 241 0 214 77 146 52 0.0 53.8 29.3 45.6 53.1 53.6 69.6 59.5 51.1 0.0 54.6 12.394****** 14.772 0.947 50.4911 66 47 0 12 4 7 29 59 28 0 252 -3.99 10.12 161.31 76+07 0.871 0.0 60.8 41.1 52 · 57 · 6 56.2 50.3 0.0 60.3 12.967 2.776 28.269 70.4 61.3 0 71 -0.39 9.92 130.17 76.40 40.52 0 2 3 14 14 14 10 12 2 2.665 19.331 0.710 70.8 62.0 0.0 58.7 46.2 50.6 62.3 53.3 55.0 0.0 59.2 12.734 0.830 8.52 274.36 79.59 37.86 0 165 0.15 25 28 0 6 8 22 46 6 24 0.0 60.2 46.8 58.7 61.5 53.9 54.5 0.0 61.3 5.664 2.304 22.228 0.518 0.707 64.9 72.3 0 6 1.48 0 0 0 0 5 1 0 0 0 0.7323 6.0 59.6 0.0 0.0 0.0 0.0 0.0 58.0 67.6 0.0 0.0 1.92 235 131 186 С 232 328 0 234 91 66 0.5135 31.7 50.9 54.8 51.7 0.0 54.4 55.8 70.2 60.3 0.0 1.50****** 0.78 0.36 885 618 0.7590****** 0.6838 0.2483 58.4 53.8 4.04 3.56 2.59 2.13 1503 56.5 1.2490 1.2948 0.9264 0.7808

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0.07

TABLE 8

									1							
			60	MINUT	E AVER	AGE AT	15:0		FI	LE: M	AY 4.19	76 ATGRADE				
	313	681	0	532	260	155	657	118	336	9	30.61	0.18	****	215.46	74.52	578+2
	69.6	60.5	0.0	53•9	28•4	45 a 7	54,3	53.5	50+7	52.5	54 • 1	15.156	*****	15.868	0.790	196.0097
	160	138	0	49	32	30	109	54	1 37	0	709	-2.08	12.06	157.41	75.67	
	70.8	61.4	0.0	58.1	38.0	54.1	61.8	54.7	56.0	0.0	60•4	14.139	3.856	29.923	0.921	
-	44	54	С	22	9	17	50	8	53	1	258	0.70	10.77	134.44	76,12	41.19
	68.8	61.4	0.0	58 . 5	42.0	57.9	60.4	54.4	56,0	78,5	60.0	12.401	3+561	22.692	0.717	1.271
1	42	73	c	30	17	5 9 °	106	5	96	2	.430	0.44	9,22	251,63	79.08	38.93
÷	73.4	61.7	C • 0	60•3	43•6	57.9	63.0	56.4	58.5	88.2	61.2	5.921	2.833	28.786	1,034	1.039
	0	0	0	0	0	6	4	0	7	.0	17			2,17		
	0 • C	0.0	0.0	0.0	0.0	59.5	68.5	0.0	56.2	0.0	60.2			0.8026		
	559	946	. 0	633	318	261	922	185	622	12				2,54		
	70.2	60.8	0.0	54•7	30+5	50 - 2	56.5	54.0	53.5	60.6				3, 5546		
			2456					2002				1.02	0.74	0.94	0.39	
			57.4					54•5				1.5598	0.6203	0,6535	0.2717	
					44	458						2.98	2.51	2.05	1.60	
					56	5•1						1.1295	1.1714	1.2173	2.2796	
			. 60	MINUT	TE AVER	RAGE AT	16: 0		FI	LE: N	1AY 4.19	76 ATGRADE				
	426	858	1	755	307	144	667	148	470	1	3777	-0•37×	****	216.14	74.54	702-1
	69.6	59, 8	46.5	54.0	28•1	45 • 6	53.3	53•5	51.3	56.7	54.2	14.682	******	16,858	0,857	46,4295
	2.25	170	0	49	28	33	128	140	101	0	874	-2+85	11+17	167.07	75,78	
	70.2	60,9	0.0	59•3	39.6	54 • 1	59.6	55•3	51.7	0.0	60 • 1	14.520	3,123	28.384	0,781	
	40	50	C	13	12	16	55	39	39	0	2 64	-0.00	10.37	134.50	76.20	40.00
	70.2	61.5	0.0	58.8	43•3	55.5	61.0	54•1	52+8	0+0	59.0	12.297	2.897	22.927	0.573	0.882

91 1 524 0.27 8.76 281.39 79.63 37.51 67 132 76 92 0 19 31 15 5.776 2.798 29.823 0.730 0.645 0.0 56.9 44.8 57.9 63.2 52.9 55.5 58.7 61.0 72.9 63.2 5 0 1 0 20 2.01 2 0 12 0 С 0 0.0 0.0 60.3 64.5 0.8394 0.0 48.4 0.0 62.4 76.9 0.0 C+0 1.79 342 701 2 1 836 378 260 982 767 1170 70.1 60.3 46.5 54.5 30.8 50.5 55.9 54.3 51.9 57.7 0.5353 1.19****** 1.33 0.38 31 52 2287 .

** ***	57.6	53.8	0.8139***** 3.5399 0.2751
0•11	5439		3•37 3•21 2•80 2•02
0•3413	56•0		1•7050 1•6380 2•7462 0•6783

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****** ******* 0.05 0.2868

TABLE 9

			5	5 MINU	TE AVER	RAGE AT	r 16: 5	5	E		AY 4.19	76 ATGRADE			
· .	33	74	0	75	31	16	37	19	31	4.	320	7.77******	231.03	75.46	676.6
	69.5	59.8	0.0	51.8	28.3	37•1	48.8	51.1	47.4	55.4	51.7	18.991*****	< 20.105	0,712	73» 9459
	27	18	0	5	7	2	13	21	19	1	113	6.53 8.6	197.50	76.96	
	71.0	59.5	0.0	59.5	38.1	27.5	48.5	51.8	43.9	43.5	54.9	14-285 2-685	5 21 4 3 6	0.688	
													/ LA9900	4.000	
	5	9	0	Q	1	· . 1	- 4	8	7	e	· 35	1.99 7.63	144.13	77.38	39,85
	70+2	59.5	0.0	0.0	39.8	25.6	40.7	53.7	41.3	0.0	52.4	10.538 1.662	27.924	0.548	0 • 451
	. 8	9	0	0	- 1	5	9	4	9	0	45	1.21 6.84	270.55	80.75	37.53
	 70 • 4	63.1	0.0	0.0	47e 6	49•7	49.7	55+7	44•4	0.0	55,5	6.650 2.209	35,852	0.569	0.441
		•	•	•			•		•		_				
	0.0	0.0	. 0.0	0.0	0.0		<u> </u>	0	0	0	3		2.30		
		0.0	0.0	0.00	0.00	30 6 4	0.0	0.00	0.00	0.00	30+4		0,8400		
	73	110	0	80	40	24	63	52	66	5			2.35		
	70.2	60.0	0.0	52.3	30.8	38.5	48.3	52.1	45.3	53.1	•		0.7737		
													001707		
*****			303					210				2 • 29******	1.60	0.22	
*****			56+6					47.3				1.2927******	0.4398	0.1846	
· · · · · ·															
-0.01				•	5	513						4.71 4.59	3,12	2,29	
0.2265					52	2.8						1.4020 1.4870	0.7256	0.6139	
	'														
			5	MINUT	E AVER	AGE AT	16:10		FI	LE: M	AY 4.19	76 ATGRADE			
	46	79	0	85	29	13	18	31	14	0	315	-0.23******	220,48	74,89	605.0
	 68.5	59.3	0.0	53.6	28.2	17.5	12.5	41.1	15.1	0.0	48.1	14.830******	15.734	0.347	18,2620
	21	19	0	5	3	11	7	51	28	0	145	-2.29 10.41	168.55	76.49	
	68.6	58.7	0.0	57.1	34.7	21.9	16+8	41 • 1	16.9	0.0	40.5	11.452 2.922	25.759	0.535	
	 	_			_										
	8	7	0	1	5	7	2	13	14	0	57	0.24 9.51	134.95	76391	39,74
	00.049	2701	0.0	53.5	40.2	23.4	1.30 9	3901	20+5	0.0	38•8	11.711 3.004	20.648	0.351	0.174
•	10	5	Ô	1	4	8	1	2	c	•	4.0	-0.07 0.74	202 71		
	71.6	63.8	0.0	60.6	42.8	24 . 1	11.2	38.4	17.7	0.0	42.7	- JeUS 9834 5.546 3.370	30-280	8041Z	3/029
								000				01040 01019	309205	483333	Vevos
	- O	0	0	0	0	1	0	0	1	0	2		1.66		
	0.0	0.0	0.0	0.0	0.0	27.9	0.0	0.0	15.8	0.0	21.8		0,8178		
	85	110	Ċ	92	41	39	28	97	65	0			. 1.75		
	68.9	59•4	0.0	53.9	31.6	21.2	13.6	40.8	17.4	0.0			0.4152		
ەت. بىلە بىلەرىق بولە بولەر			700							· · ·			. -		
******			328 56.9				•	229				1.57******	C • 96	0.26	
*****			30.0					2 (e D				141453******	0.7076	0.1951	
0.09					5	57						5.13 4.85	3.07	2. 47	
0.3986					44	.8						1.8402 2.1286	2.0032	0.9012	
												**************		~ ~ ~ ~ ~ ~	

67

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			5	MINUT	E AVEF	AGE AT	16:15	;	F	ILE: M	AY 4,19	76 ATGRADE			
	45	61	0	55	31	10	8	25	8	0	243	2.29******	225.82	75.07	602.4
	68.3	58.9	0.0	52.6	29•4	17.7	12.6	37.9	14.3	0.0	48.5	13.703******	17.136	0.794	8.0312
	11	22	0	2	з	10	16	27	17	o	108	-2.42 9.64	145.43	76.11	
	72.6	61.7	0.0	57.03	36.6	21 . 3	17.6	35.1	15+1	C • 0	37.8	13.052 3.427	32.418	0.748	
	6	6	0	3	4	1	5	17	11	0.	· 53	-0.91 9.68	114.82	76.76	30.30
· .	68•2	60.7	0.0	56.8	40•4	23.8	16.7	36.0	17+0	0.0	38.0	12.498 2.899	19.533	0.162	°0+397
	5	8	0	4	. 2	13	10	10	12	. 1	65	1.81 10.11	261.93	79.42	37.07
	77.8	59.2	0.0	56•4	40+9	25.4	18.1	33•9	17.6	101.8	35.9	4.548 2.606	20.570	0.407	0.503
	0	0	0	o	0	0	1	0	2	0	3		3.42		
	0.0	0.0	0.0	0.0	0.0	0.0	24.5	0.0	23.7	0.0	23.9		1.7020		
	67	97	• 0	64	40	34	39	79	48	1			2.22		
	69.7	59.7	0.0	53.1	31.6	21 • 9	16.6	36.0	16.0	101.8			0.5872		
			268					201				2 . 76*****	2.14	0.24	
			56.4					25.4				1.4297******	0.9716	0.2194	
					4	69						7.71 7.08	5,39	3.72	
	· ·				43	• 1				•		2.5577 1.7721	1.3851	1.3464	

		् 5	5 MINUT	FE AVEF	PAGE AT	16:20		FI	LE: M	AY 4,19	76 ATGRADE				
39	59	0	54	39	9	16	28	6	0	250	0.64*	*****	201.89	74.57	577.6
68.9	59.9	0.0	55+6	28.6	26.7	15.5	38.3	15.1	0.0	48.0	9•880*	*****	90947	1,295	31.1689
18	13	. 0	8	1	11	21	37	21	0	130	-3.76	12.32	140.96	75.52	•
72.2	60.5	0.0	58.9	48•2	25+8	1809	40.3	21.0	0.0	40•2	11.343	3,118	34.301	1.546	
7	10	c	1	2	4	з	12	8	0	47	-0.93	11.69	115.29	76+25	39.45
66.8	59.2	0.0	55.7	45.2	22 • 2	20•5	39.4	23.3	0.0	42•9	8.925	3.331	15.340	0.913	0.661
З	12	o	2	6	25	22	6	29	o	105	1.92	10.66	264,20	79,40	37.08
71 • 6	59.8	0.0	58.4	43.0	25 • 2	22.2	34•0	21.3	0.0	30.9	4.683	2.496	14,178	0.815	0.608
1	. 0	0	0	0	5	2	0	0	0	8			2.23		
77.8	0.0	0.0	0.0	0.0	26.7	25.5	0+0	0.0	0.0	32.8			0.9532	•	
67	94	. Q	65	48	49	62	83	64	0				2.18		
69.7	59.9	0.0	56 • 1	31.5	25.3	19.3	39.0	20•9	0.0				0.6894		
		274		•			258				2.26*	*****	1.69	0.40	
		56.4					27.2				1.3444*	*****	0.7146	0.3225	
		56.4					27.2				1.3444*	*****	0.7146	0.3225	

532 5.32 5.13 4.39 2.52 1.7951 1.8313 1.2920 0.6428 42.2

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0.02 0.3424

0.13 0.3860

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			5	MINUT	E AVER	AGE AT	16:25		FI	LE: N	AY 4,1	976	ATGRADE				
	46	70	0	64	32	19	31	16	. 18	1	297		0.82*****	** 22	032	75.02	544.6
	69•6	59.8	0.0	54.7	28.9	33•9	47.9	48.4	43.2	38.9	52.3		14.859****	** 15	.872	0.716	18,7617
	17	21	o	5	2	12	14	23	24	0	118		-0.98 9.	49 17	0.82	75.72	
	70.9	61.7	0.0	59•4	37.6	41 • 5	45+8	48.9	26.6	0.0	49.0		16.354 3.0	25 32	•750	0.519	
	5	4	٥	0	n	7	7	14	·	^			0 00 °	06 8 4		75.00	
	73.0	60.5	0.0	0.0	0.0	32• 8	43.3	44.9	27.1	0.0	45.2		10.036 2.7	72 28	•128	75892 0.174	40° 29 0° 409
en	3	7	· 0	Ó	3	12	17	2	15	c	59		-0.11 8.	33 28	3,30	78,65	38,24
	68.3	68•4	0.0	0.0	42.5	43.2	44.3	52.7	28.7	0.0	44•4		6.218 2.2	90 31	•764	0.269	0.493
	0	0	0	. 0	. 0	з	1	. 0	з	0	7			:	2.12		
	00	0.0	0.0	0.0	0.0	35.0	53.0	0+0	39.6	0+0	39•1			0.	7733		
	71	102	0	69	37	46	59	52	65	1					2,52		
	70 • 1	60•8	0.0	55.0	30 • 5	38.2	46.1	48.0	31.7	38.9				0.1	8124		
	1 - A		279					233					2	**	1.59	0.46	
			57.7			•		40.9					1.2691****	** 0.	7255	0.2000	
					e	12							4.60 4.	13	3.16	2.22	
					50	• 1							1.5658 1.71	48 1.	3105	0.7996	

5 MINUTE AVERAGE AT 16:30 FILE: MAY 4,1976 ATGRADE 47 76 0 76 31 9 51 15 44 0 349 -3,31*************** 73,80 587.4 70.7 60.8 0.0 53.6 28.9 46.3 52.2 56.2 51.2 C.O 54.7 12.525*********** 0.697 19.9499 17 22 0 1 2 0 9 21 Ģ 0 81 -0.25 10.46****** 75.49 63.0 37.9 70.9 61.2 0.0 0.0 62.7 55.3 47.9 0.0 59.8 12.812 4.490******* 0.582 5 З 0 0 4 4 4 2 0 26 1.78 8.87****** 75.94 41.07 4 69.4 63.6 0.0 0.0 42.8 53.7 60.9 53.7 47.2 0.0 56.8 11.977 3.261****** 0.320 0.341 0 7 1 2 З З 23 0 1 6 0 1.08 8.02***** 79.74 38.16 0.0. 67.1 0.0 65.5 45.8 58.7 60.1 65.2 53.6 0.0 59.6 4.534 2.300****** 0.240 0.449 0 0 0 0 0 1.29 0 0 0 0 1 1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 47.6 0.0 47.6 0.4377 69 108 0 78 39 16 67 41 61 0 1.78 53.9 31.7 50.5 54.5 55.7 50.8 0.0 70.6 61.3 0.0 0.3728 1.55****** 0.72 294 185 0.47 57.6 53+2 0.8024***** 0.7917 0.2965 479 3.05 2.71 2.61 2.06

0.9071 0.9262 0.9027 0.5268

55.9

0.18 0.3864

69

****** *****

· 0.03 0.3200

				Ę	5 MINUT	TË AVËP	AGE AT	. 16.30		67		INV 4 40					
		42	67	0	61	26	7	51	19	45	LC. N	4AT 4,19 319	76 AIGRADE			-	
		70.0	60.0	0.0	52.9	29.4	45.3	53.5	57.1	50.9	0.0	54.6	17.023*	******	219:70	74:49	597.4
															619140	18033	1/00045
		19	19	0	1	4	2	6	13	6	0	70	-0.62	9.62	164.03	75,57	
		11+2	01.5	0.0	51+9	36.7	57.0	. 60 • 1	54.4	51.0	0.0	60.1	14.901	2.492	25+691	0.514	
		4	7	0	0	1		7	h	ry.	~						
	· ·	74.6	61.9	0.0	0.0	37.7	58.4	64.3	57.3	49.0	0.0	60.5	-0+17 10:400	9.50	127.94	75.89	41.41
•	•										0.00	0000	206490	20000	1/02/2	Ve 507	0:372
		3	3	0	0	3	4	5	3	9	0	30	1.53	8.53	272+56	79.06	38,65
		70 • 6	63.3	0.0	0.0	39.1	62.5	62•9	49+1	55.5	0.0	57.7	4.337	2.148	22.959	0.300	0.389
		0	0				•	•		•							
		0.0	0.0	0.0	0.0	34.0	0.0	0.0	0.0	0.0	0.0	1			1 . 47		
			•					•••			0.0	3460			0.5032		
		68	96	0	62	34	16	65	39	€3	0				2.13		
	in a second	70 • 7	60.5	0.0	52+8	31.4	53 • 5	55•3	55.6	51.4	οò				0.4070		
*****							,		-		·						
******				57.5					183				1.32**	*****	0.82	0.38	
				9499					53+9		+		0.9103**	*****	0.7308	0.2138	
-0.01						- 4	43		-				3.94	3.60	3.18	2.06	
0.2357						56	•0					•	1.1268 1	.2018	1.0959	0.5031	
														•			
													· · ·				
				5	MINUT	E AVER	AGE AT	16:40		FI	_E: M	AY 4.197	76 ATGRADE				
		53	81	0	56	32	9	42	19	54	0	346	2 7.9**	*****	212.64	74.62	540.5
		69•6	60.6	0.0	53.0	27.4	52•4	51.1	53.8	50.7	0.0	54.4	12.905**	****	18.087	0.193	19,0788
•				•	•												
		72.4	-61.7	0-0	1 60.6	2	0	15	28	9	0	84	-2.01	8.43	160.87	75.63	
		12.04			00.00	3900	0.0	279 4	5.3# Y	4900	0.0	58.4	114921	2.739	25.049	0.242	
•		- 3	5	0	0	0	0	2	4	1	o	15	-1.77	8.06	125.87	76.28	40-70
		72.0	65•5	0.0	0.0	0.0	0.0	64.7	53.9	50+1	0.0	62.6	9.322	2.583	17.945	0.462	40774 0.381
		75 1	4 60 7	0	2	3	5	5	2	11	0	38	1.03	7.77	270.94	79.36	38•26
		1241	000/	0.00	2303	40.1	60.9	61•5	52•4	54.2	0.0	5902	4.410	2.197	18,475	0,483	0.193
		.1	. 0	o	0	0	0	0	0	0	0	1			1 77		
		74.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	74.8			0.7978		
		_															
		7.4	107	0	59	37	14	64	53	75	0				2,33		
		10.0	01+0	0.0	53•2	29.6	55.4	54.2	53+8	51+1	0.0				0.4679		
*****				277					206				1 . 70++	***	0.05	د د	
*****				57.7					53.1			•	0.6828**	*****	0.7463	0.1766	
															v . / ~00		
0.08						4	83						4 • 96	4.54	3.43	2.58	
Us 2442			· •			55	•7						1.0284 1	• 4435	0.8890	0.5344	

					5 MINU	TE AVER	AGE AT	16:45	5	FI		MÁY 4,19	76 ATGRADE				
		50	68	0	50	23	9	39	31	36	2	308	-0.74*	*****	212.80	74.29	561.0
		69.5	59•5	0.0	55.2	26.6	43•3	52.2	49.8	50.9	51.4	54.5	14.077*	*****	13.221	0,963	19.3778
		18	24	0	6	3	1	10	18	. 6	1	87	-1-41	12.00	150 50	75 10	
		70 • 1	63+1	0.0	58.0	34•3	48.2	61.2	49.1	51.5	62.3	59.1	13.408	14600	30.010	1 201	
													100 400	- 0 009	J7641 0	19751	
		5	11	0	1	2	0	4	7	6	0	36	0.13	12.94	119.76	75.31	40.48
		71.6	62•4	0.0	57 . 5	39•1	0.0	61.7	49.5	56.2	Ó. O	58.6	12.604	2.822	14.172	0.908	0.345
		. · · _	_			•											
		74 0	5	0	2	.3	3	7	2	11	0	38	1.09	12.48	271.63	78.16	38.11
		(4.8	0304	0.0	55.0	46.9	53•4	64.1	43•8	53.8	0.0	59.2	5.564	3.316	18.037	0.960	0.443
		· •	^	•	•	•	-		•	•							
		0.0	0-0	. 0.0	0.0	. 0.0	50 7	0	0	0	0	2			1.56		
							5943	V60	0.0	0.0	0.0	59+3			0.4437		
•		78	108	0	59	31	13	60	58	59	7				• •		
		70.1	60.8	0.0	55.9	30.1	46.0	55.7	49.3	52.1	55.0				19/8		
															003030		
*****				276					193				1.14**	*****	0.58	0.25	· .
*****				58.9					52.0				0.3936**	******	0.4335	0.2995	
											÷	•				444550	
-0.08						- 4	69					•	3.53	3.40	2.87	1.82	
0.2975						56	•1						0,9079 1		1.1511	0,6595	
		-															
				5	MINUT	E AVER	AGE AT	16150		ET	15		74 ATCONDE				
		40	76	0	63	30	9	40	16	35	LL. M	300	O AIGRADE	ىد بار بار بار بار بار	007 01	77 60	
		69.7	60.4	0.0	54.9	26.4	44,0	54.0	51.7	50.9	0.0	54.4	15,252**	******	13.756	(3009	531.2
												0404	10820244		130120	0003	130 (385
		19	21	0	2	5	0	5	11	9	0	72	-2.38	11.16	154.60	74.31	
		71.8	62.0	0.0	57.6	38.1	0.0	62.7	51.5	51.5	0.0	59.9	14.816	3.805	37.398	0.971	
															014090		
		3	2	0	1	1	З	1	7	4	0	22	1.73	10.32	128.23	75.29	40.42
		71.3	56,2	0.0	61.3	40.2	53.0	56.8	52.4	52.3	~ • 0	55.4	10.472	2.584	14.210	0.403	9.314
		5	8	0	0	З	2	5	3	8	0	34	1.25	10.21	272.52	78,00	38.04
	•	73•9	64.7	0.0	0.0	43.1	56.4	65.7	51.9	54.2	0.0	60.2	4.914	2. 293	16.565	0.507	0.183
		~	~	~		-	~	-		_	_						
		0.0	0	0.0	0	0	0	0	0	2	0	2			1.92		
		0.0	U e U		0.0	0.0	0.00	0.0	0.0	53.0	0.0	53.0			0.9754		
		67	107	0	66	30	1 4	E 1	77	E 4	•		;				
		70-7	61.0	0_0	55.1	29-6	47.7	94 55-1	51-8	51-5	0-0		۰,		.2.06		
			~				- T (B (2140	J10J	0.0				Ve 3342		
*****				279					158				1.47**	****	0.71	0.51	
*****				57.5					52.7				0.6837**	*****	0.8102	0.2360	
													V V V V V V V V V V			092000	
0.13						4	37						4.50	3.88	3.27	2.15	
0.2976						55	• 8						0.8884 0	.9598	0.8709	0.4054	

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•										TABI	LE 9 (continue	ed)			
				ę	5 MINU	TE AVER	AGE AT	16:55	5	F		MAY 4.10	76 ATCRADE			
1		41	79	0	55	25	6	37	23	43	ი	309	-3-57****	*** 311.40	77 54	
		69.4	59.8	0.0	54•8	28.5	40.2	53.9	51.7	49.6	0.0	54.5	12.001****	*** 13.030	(3051	481.0
															09520	1364104
		14	16	0	2	1	0	4	23	5	0	65	-6.35 11	.94 161.95	74-08	
		70 • 8	61.8	0.0	63.6	37.1	0.0	61.2	53.6	54.0	0.0	59.9	11.977 2.	120 28.140	0.878	
				_												
		70 7	4. 41 0		57 1	1	2	4	7	1	0	22	-1.76 11	•09 130 • 27	75,07	40.90
		1203	0102	0.0	5/41	42.0	28*2	55e2	49.3	58.1	0.0	57.8	12.718 2.	215 21.198	0.311	0.188
		2	2	0		•	7	-	•		~					
		71.5	63.3	0.0	0.0	0.0	55.7	66.3	0.0	54.7	<u> </u>	22	-0.92 9	• 43 284• 21	77.89	38,42
· · · ·								00*0	200	0407	0000	2900	00/41 20	858 25.636	0.411	0.125
		́о	0	0	0	0	٥	0	0	Ó	0	•				
• · · · · · · · · · · · · · · · · · · ·		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00		1:31		
			•											084034		
		59	:01	0	58	27	11	48	53	59	2			1.91		
		69.9	60•2	0.0	55.1	29.3	48.2	56+2	52.2	50.9	63.5			0.4793		
											•					
*****				245					173				1.00****	*** 0.56	0.42	
*****				57.9					52.8		4		0.4852****	*** 0.7451	0.3342	
A 10																
0.2947						4	18					•	3.37 3	.17 2.71	1.97	
002247						55	•8						1.3602,1.2	623 1.2756	0.6824	
				5	MINUT	E AVER	AGE AT	17: 0		FI	LE: N	AY 4,197	6 ATGRADE			
		. 42	68	.0	49	30	4	40	16	42	5	296	0.60****	*** 220.08	73,69	477.0
1		70.2	60.9	0.0	51+3	28.0	47.0	54.1	54.6	53.0	58.2	54.7	11.976****	*** 18.329	0.422	9,3274
•																
		14	14	0	- 4	3	0	2	13	5	0	55	-2.22 9	32 170,54	74.61	
		70.0	0208	0.0	58.0	38,2	0.0	56,1	52.9	53+1	0.0	59.5	17,612 2.	935 32.721	0.,794	
		7	0	•				<u>.</u>		•						
	.*	67.2	.62.3	0.0	41.0	5	= 0	3	4	1	0	24	0.54 8	48 137.94	74:98	41.44
		0102	02.03	0.0	0103		2249	02#1	520 0	30.4	0.0	59.0	9•258 3•:	200 28.570	C. 687	0.399
		3	. 3	0	٥	З	7	6	7	A	1	70	0.00 -	05 077 10		
		58.4	60.5	0.0	0.0	42.7	61.7	63.1	52.7	58-2	102-2	50 60 • 1	0022 7: 4-811 7:	108 55 VUS 120 X((*10	0.600	38+75
						· — 🔻 ·						~~ * *		144 238423	80044	901 AR
		0.	0	0	0	. 0	1	0	0	0	1	2		1.40		
		0.0	0.0	0.0	0.0	0.0	64.4	0.0	0.0	0.0	113.7	89.0		0.6130		
		62	94	0	54	- 38	8	51	36	56	6			2.05		
		69.9	61.3	0.0	52.0	30 • 7	53.6	55,7	53øö	53.8	65,5			0.6109		
*****				040												
*****				240 56.7					157				1.48****	*** 0.64	0+44	
1. 11. 11. 11. 11. 11. 11. 11.				0047					24 * 9				0s5347****	*** 0.3737	0.3098	
-0.01						4	05						7-20 0	07 0 00	0.00	
						-							3020 Ze	08.65 10	2422	

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-0.01 0.3809

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56.0

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1.1578 1.2238 0.8029 0.8181

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								r	FABLE	10						
			. 15	MINUT	E AVER	AGE AT	16:15	5	F	ILE:	MAY 4.197	76 ATGRADE				
	124	214	· 0	215	91	39	63	75	53	4	878	3.28*	*****	210.05	75.14	611 7
	68•7	5904	0.0	52.7	28.6	25.6	33.8	42.6	33.8	55.4	49.5	16.245*	*****	20.175	0.648	42.4500
	50	5.0														
	70-4	27	0	12	13	23	36	99	64	1	366	0.61	9.56	166.97	76,49	
	1004	0001	0.0	2001	37.0	95.01	28+6.	41.7	24.4	43.5	44.1	13.562	3.064	29.942	0.691	
	19	22	0	4	10	9	11	38	22	0	145	0 4 4		171 00		
	69.0	59:9	0.0	56.0	40.2	23.7	24.9	40.8	23.9	0.0	41.8	11-620	8+94	131+02	77.02	39.66
										000	4100	119020	20/10	20 490	Ve 458	0.402
	23	22	0	5	7	26	20	16	30	1	1 50	0.99	8,77	271.44	80.10	37.36
	72.5	61•9	0.0	57.2	42.9	29.7	32.0	39•9	25.7	101.8	43.6	6.029	3.069	30.540	0.750	0.387
	0	•	· · ·	•	•				_							
	0.0	. 0.0	0.0	0.0	0 0	4		0	3	0	8			2:46		
	0.00		0.0	0.0	.0.00	34 6 3	2405	0.0	21.0	0.0	28.1			1.3686		
	225	317	0	236	121	97	1 30	228	179	6				~ • •		
	69.6	59.7	0.0	53+1	31.3	25.7	.31.3	41.7	27.3	61.2				2011	5.	
														0439		
***			899					640				2.21*	*****	1.57	0.24	
****			56.6					33.3				1.3445*	*****	0.8633	0.1941	
0.3214					15	39						5.85	5.51	4.16	2.83	
000214		•			4 0	• 9		<i>.</i>				2.3478	2.0889	1.7072	1.1840	
							7								· · ·	
							1									
			15	MINUT	E AVER	AGE AT	16:30		FI	LE: M	AAY 4,197	6 ATGRADE			·	•
	1 32	205	0	194	102	37	<u>\</u> 98	59	68	1	896	-0.56*	*****	212.41	74.46	569.9
	69.8	60+2	0.0	54.5	28.8	35•2	44.9	45.6	45•9	38.9	52.0	12.645*	*****	15.861	1.020	29.1694
	. 50	56	•	1 /	· _	~ 7					` 					
	71.3	51.2	0.0	59	30-8	23	26.4	81	29 0	0	329	-1.68	10,76	159.54	75.58	
		~		07.0	0 98 0	3 4 8 Q	3014	404 /	2000	0.0	48	13.669	3.737	34.472	0.931	
	17	17	0	1	б	11	1.4	27	18	0	111	0.59	G. 84	130.70	76.04	40.41
	69.4	60.2	0.0	55.7	43.6	36.5	43.4	43.7	27.6	0.0	46.9	10.374	3.349	26.113	0.547	0.845
								- ¥.								••••
	6	26	0	3	11	40	42	9	50	0	187	0.96	9+00	274.68	79.26	37.83
	69•9	64•1	0.0	60.8	43.4	33,1	33,9	41.6	27•4	0.0	38.7	5.267	2.611	25.263	0.671	0.733
		•	•	•			-			_						
	77.8	0.0	0.0	0.0	0.0	30.8	3	0 0	4	0	16			1.87		
				000	0.0	2700	22#0	0.0	41.0	0.0	3005			0.8343		
	207	304	o	212	124	111	198	176	1 90	1				2.15		
	70.2	60.7	0.0	54.9	31.3	34.3	40.6	45.6	34.2	38.9				0.6931		
										-						•
***			847					676				2.03*	*****	1.32	0.45	
***			57•3					39.0				1.1700*	*****	0.8464	0.2724	
0-11					9 C	93										
0.3563					· 10	•2						4.29	3,95	3.35	2.27	.*.
					~ 7	. .						100000		19 32 48	Ve0661	

										TAB	BLE 10	(continu	.ed)		4		
				15	MINUT	E AVER	AGE AT	16:45	5	F	ILE: N	4AY 4,1976	5 ATGRADE				
		145	216	0	167	81	25	1 32	69	135	2	972	3.20*	*****	21,4.99	74.47	566.3
		69.7	60•1	0.0	53.6	27.8	47.•1	52.3	52.9	50.8	51 • 4	54 • 5	15.060#	******	17.988	0.644	29,8855
1.1.1		49	60	0	8	9	3	31	59	21	. 1	241	-1-35	10-31	159-58	75.44	
		71.1	62.2	0.0	57.6	36.6	54.0	60.1	52.6	50.5	62,3	59.2	13.387	3.845	31.190	0.807	
				-		-											
		12	63 0	0.0	57 5	3	3	9	15	10	0	76	-0.60	10.17	124.50	75.82	40.88
٠		1201	0207	0.0	5785	2000	20 8 4	03#2	5401	5394	0+0	80.0	10.874	3+218	16.793	0.732	0.6533
		14	12	0.	4	. 9	12	17	7	31	0	106	1.22	9.60	271.70	78.86	38.34
		74.0	62.5	0.0	59 . 2	44.0	59.6	62.9	48.5	54.4	0.0	58.8	4.798	3.303	19.864	0.796	0.412
				•			2	~	•	•	•						
		74.8	0.0	0.0	0.0	34.0	59.3	0.0	0.0	0.50	0.0	56.8			1.5046		
				•••								2010			CB J340		
		220	311	0	180	102	43	189	150	197	3				2.08		
		70.4	60 <u>•</u> 8	0.0	53.9	30.4	51 + 9	55e 1	52+5	51.5	55.0				0.4637	•	
******				81.3					582				1.42	****	0.78	0. 72	
*****				58.1					53.0				0.7240*	*****	0.6491	0.2338	
-0.00						13	395					•	4.14	3.82	3.16	2.15	
0.2010						55) e 'Y						1.1615	1.3060	1.0409	0+6376	
		•															
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•				15			AGE AT	17.0				144 4 1074	ATCOADE			• •	
		123	223	ō	167	85	19	117	55	120	5	914	-0.12*	*****	212.83	73.63	495.4
		69.8	60.3	0.0	53.8	27.6	43•4	54.0	52.5	51.1	58+2	54.5	13.331*	*****	15.998	0.522	27.9617
									. –		_						
		47	51 62-1	0	50.3	38.0	0-0	61-0	52.0	52.6	0-0	192	3.65	10.81	162.58	74.33	
		~	0241	0.00	J7 4 J	. 5000	0.00	07 #0	5205	JLOU	0.00	390	15.002	30119	224201	00000	•
	. (8	15	0	З	.4	6	8	18	6	°.	68	0.17	9.97	131.96	75.12	40.92
		70.0	61.2	0.0	60.1	41.3	55.6	63.0	<u>51•</u> 2	54.0	0.0	57.4	10.961	2.871	22•446	0.482	0.524
		10	17	0	0	· A	g	1.4		26	7	86	0.1.8	0.20	277. 80	77.07	38.40
		71.8	63•5	0.0	0.0	42.9	58.5	64.7	52.3	55.6	77.7	60 •1	5.618	2.852	23.661	0.509	0.344
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		0.0	0.00	0.0	UeO	0.0	64 • 4	0+C	0.0	53.0	11307	/1 o 0			0.7373		
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		70.2	60•8	0.0	54.2	29•9	49.3	56,0	52 . 5	52.1	65 . 5				0.4763		
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				. 61.	MINU	IS AVEN	CAGE 41	1/1.0		-4	ILE: N	MAY 4,197	5 ATGRADE					
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1		69•5	60.0	0+0	53.0	- 28,3	35.9	48.2	43.1	47.6	54.5	52.7	14.474*	****	17.808	0.900	52.5267	
		207	226	0	42	36	49	122	2.86	158	2	1128	-1.52	10.36	160.70	75 66		
		70.9	61.4	0.0	58.7	37.5	29-6	42.4	47.3	72.5	62.0	E1 0	17 067	10800	102030	(0640)		
						3.40	2040			.) <u>C</u> e J	0249	51.02	13.901	3,487	32.249	1.118		
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•					y	23	29	42	68	66	0	400 -	0.15	9,73	129.45	76.00	40.46	
		7 0 • 0	61.1	0.0	57.5	41.01	38.9	46,5	45.3	32.1	0+0	49•3	10,960	3.067	23.060	0.888	0.773	
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		53	73	0	12	33	. 86	. 93	38	137	4	529	0.84	9.14	273.90	79-04	37.98	
		72.5	63.0	0.0	58.8	43.4	38.1	43.4	43.8	38.5	83.8	47.6	5.457	2.967	25.256	1.046	0 670	
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									4.39.7				100033	*****	0.8411	0 * 2051		
0.06																		
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		509	975	0	721	327	בי גר	482	230	454	27	3766		يدريد الريطريك		70.00		
		68.9	60-0	0-0	53.5	27.0	47.7	576	67 0		E7.4	5100		****	221039	12.99	312.6	
			00.00	0.00	00.00	2	41.61	2380	2360	2102	0314	549 /	15•247*	****	14+409	0.099	148.2116	
				•			• •				-							
		214	1/5	C .	-31	26	10	55	226	65	3	805	-2.40	11.28	174.60	74,03		
		69.65	61.0	0.00	60.0	38.3	58.0	61.6	55•5	52.7	60e 7	60,3	15.400	3,350	23.400	0.742		
		42	60	0	14	8	7	28	48	28	4	239	0.83	9.86	139.82	74.54	42.57	
		69.5	61.9	0.0	599	40.9	59.5	60.0	55.7	53.4	81.	60.2	12.000	7. 717	21.955	0.668	3-513	
														0.010		00000		
		58	78	Ċ	à	35	23	43	21	77	15	350	0.20	8.10	222 04	77 7=	20 70	
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		72.8	58.0	0.0	0.0	37+1	67.6	0.0	0+0	0.0	143.2	72.8			0.6508			
		823	1288	0	775	396	73	608	533	624	49	•			1.79			
		69.5	60.4	0.0	53.9	30.2	54.6	55.3	54.7	52.1	68.3				0.6564			
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يهي راي مشر راي من مرد				0100					54.4				0.5011*	*******	****	0,2062		
0.07						51	69						3.38	3.30	2.42	1.80		
0.2618						56	• 4						2.2166	1.2827	0,9588	0.5991		
*																-		

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# Appendix A

//STEP1	EXEC A	SMEC							
1/ASM.SY	STN DE	) <b>*</b>							
OSIO	TITIE	1 054	M VADT	ADIE LENC	TH TNO				
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*	OS AM	VADIABLE	LENCTH	THOUT				*	QSI00030
*	DACKE	TARIADLE	LENGIA	DEVIDENT	IPUT R	DUT INE	= FORTRAN	*	QSI00040
*	RUCKE	TOTNE DIV	12100	N. A. R	•		2/12/68 -	*	QSI00050
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	***	******	*****	*****	* * * * * *	******	****	******	QSI 00070
*		001						*	QSI 00080
**	ENIRY	PUINIS						*	05100090
*							•	*	QSI00100
*			GETR	INPUT	(OPE)	N DCB I	F NECESSARY)	*	05100110
*								*	05100120
*			PUTR	OUTPUT	( OPE	N DCB I	F NECESSARY)	*	05100130
*								*	05100140
*			ENDQ	CLOSE (	DATA CI	ONTROL	BLOCK	*	05100150
*						_		*	05100160
*****	* * * * * *	******	******	******	*****	*****	****	****	05100170
*								*	05100170
*	THIS	ROUTINE M.	AY BE U	ISED TO RE	EAD/WR	ITE SEO	UENTIAL DATA	*	05100100
*	SETS.	THE DAT	A MANAG	EMENT JSE	ED IS	SAM.	ONLY ONE DAT.	Λ <del>*</del>	05100190
*	SFT E	ACH CAN B	E INPUT	AND DUT	DUT AT	A TIME	THAT IS.	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	05100200
*	ONE D	ATA SET FI	OR INPU	IT AND ONE	DATA	SET FO	R OUTDIT CAN	*	05100210
*	BE OP	EN AT THE	SAME T	TME. IN		TOINPI		o= +	05100220
*	THAN	ONE DATA S	SET. TH		ATA SE	T MUST	BE CLOSED	* *	05100230
*	PPIOR	TO INPUT	/QUTPUT	OF THE	NEWI	ATA SE		÷ ب	usi00240
*								*	05100250
*	DATA	SETS ARE /	AUTOMAT	TCALLY DE	DENED V	HEN CE	ז מדום פר פז	с т *	US100260
باب	CALLE	D AND THE	DCB FO	R GETR OF	PUTO		SED. DATA CO	0 # 5 # 0 #	QS100270
*	AREC	LOSED VIA	CALLIN	IG ENDO.	Twn n		APE PPOVINED		05100280
×	CLOSI	NG DATA SE	ETS. NA	MELY	,		ARE PROVIDED	* >-L-1	05100290
*								*	USI00300
*	CLOSE	AND POST	TION AT	REGINNIN		HE DAT	A SET		25100310
*	CLOSE	AND POST	TION AT	THE END	OF THE	DATA G		*	USI UU 320
*			10. 41		Car (111)	. DAIA :		*	95100330
*	FOR C	ALL THE SEC	NUENCES		CIEIC	ENTON 6	20 T. I.T.	*	QS100340
*	1.20			• .31.11. <b>3</b> =0	C D IC	CNIRT	-0111	*	95100350
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0510	STADT	•							05100380
*	31441								QSI00385
*	CENED			NITTONC		~~			QSI00390
*	GENER	AC REGIST	IN DEFI	NTITINS 4	UND USA	lGH:			QS100400
<b>E</b> A	5011	•	CODATO						QSI00410
D1		() •	SCRAIC		4.445				QSI 00420
D 2		1	PARM 1	PUINTER	AND	SCRATCH	1		QSI00430
D 3			HARM 2						QSI00440
0.2 DA	EQU	2	PAKM 3	PUINIER					QSI 00450
rt ++	⊂QU	4	<b>PARM 4</b>	PUTNIEB					QSID0460

R5 R6	EQU EQU	5 6	DCB BASE REGISTER SCRATCH	QS100470
RY	EQU	7		05100490
R8	EQU	8		05100500
99	EQU	9		05100510
B10	EQU	10		05100510
R11	EQU	11	POINTER TO CALLER'S SAVE AREA	05100520
R12	EQU	12	PROGRAM BASE REGISTER	05100530
P13	EQU	13	SAVE AREA POINTER	05100540
R14	EQU	14	EXTERNAL RETURN	05100550
P15	50U	15	EXTERNAL LINKAGE	05100500
*				05100570
*	ENTRY	POINTS		05100590
*				05100600
	ENTRY	GETR		US100510
*	-			05100520
	ENTRY	DIITO	·	QS100630
*		CUIX		QSI 00640
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Υ •	CALL		*	QSI00710
*	CALL G	EIRIUUNAM	t,IND,ARRAY,NCHAR) **	QST00720
* *	DDMAKE	0.0000	*	QSI 00730
	DONAME	B CHAR	ACTER LITERAL OR VAPIABLE WHICH IS THE *	QSI00740
<i></i> チ		DUNAME	FROM THE DD CARD OF THE DATA SET *	QSI00750
بد			*	QSI00760
* *	AKRAY	ARRAY	INTU WHICH THE RECORD IS MOVED. ARRAY *	QSI 00770
		MUST B	E DIMENSIONED SUCH THAT IT CAN RECEIVE *	95100780
*		THE LA	RGEST RECORD EXPECTED. SIZE OF ARRAY *	QS100790
*		SHOULD	CORRESPOND TO BLKSIZE FROM DC3 PARM. *	95100800
*		_	*	QS100810
* .	NCHAP	INTEGE	P*4 VARIABLE. THE VALUE PASSED BACK TO *	05100820
¥.		THE CA	LLER IS THE NUMBER OF CHARACTERS MOVED *	05100830
* .		INTO A	RPAY. IF AN FRROR OR END FILE CONDITION *	05100840
*		IS DET	ECTED, NCHAR IS UNDEFINED *	05100850
*			*	05100860
*	IND	INTEGE	R*4 VARIABLE. THE VALUE PASSED BACK TO *	05100870
*		THE CA	LLFR INDICATES THE FOL: DWING *	05100880
*				05100800
*	=3	NOT MO	RE THAN ONE DATA SET CAN BE OPENED AT	05100090
*		THE SA	ME TIME BY GETR	05100900
*				05100910
*	2	DATA S	ET COULD NOT BE OPENED SUCCESSEDITY.	05100927
*	-	PROBAB	LY MEANS THAT DONAME DID NOT CORRESPOND +	05100930
*		TO DON	AME FROM DD CARD	15100940
*				05100950
			· · · · · · · · · · · · · · · · · · ·	49194900

	*		EN.		DETECT	TED				+	0
	*	•			5-1-01					*	QS100970
	*	0	) NO	FRRORS	WERE	DETEC	TED			*	05100980
	*									*	05100990
	*	>0	) AN	ERROR	HAS OC	CURRE	THE V		SSED BACK	*	05101000
	*		то	THE CA	LLER I	IS STA	TUS BYTES	DAND	1 AND	*	05101010
	*		SE	NSE BYT	ES C A	AND 1.	LEFT TO	RIGHT T	N TNO	*	05101020
	*				•	- •				*	05101040
	*****	* * * * * * *	*****	* * * * * * *	*****	****	******	* * * * * * * *	****	******	05101050
		EJECT	•								QSI01060
		USING	GETR,	R15							05101070
	GETR	8	G#1								05101080
		DC	X * 4 * ,	CL5 * GE T	R I						05101090
	G#1	STM	R14,R	12,12(8	13)						QSID1100
		L	R12.L	DPNT							QSI01110
		DROP	R15								QSI01120
		USING	0510,	R12							QSI 01130
		BAL	RF IN	IT		IN	ITIALIZE ·	<ul> <li>SAVE #</li> </ul>	AREA CHAIN	ETC.	QSI01140
		LA	35,GE	TDCB		ັງ	INT TO DOE	3			QSI01150
		USING	IHADC	B, R.5	<b>-</b> .						QSI01160
			DCHOF	LGS•X•1	0 •	IS	DCB OPEN	?			<b>GSID1170</b>
		HC .	1.6#2			YE	S. BRANCH				QSID1180
		WV C	DCHUD	NAM O (R	1)	NU	• MOVE 30	DNAME T	D DCB		QSI0119C
		MVC XC	GUUNA	ME,C(RI		SA	E DONAME				QSI01200
			ICETR	CC, 9008		0	U LRECL.	IPEN (	SETS IT FR	OM DD	QSI01210
Ω.			DCPDE	CC VII		المبارل	N DUB FJF	R INPUT	•		QSI01220
—		90	1.6#4	-05•ו1	· <b>j</b> •	WA VE	S UPEN SUC	JCFSSFUL	_?		QSID1230
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	6#2	äc	GDDNA	ME. 0121	)			NACH SAI			QS101250
	., .	BNE	FR#3	· · · · · · · · · · · · · · · · · · ·	,	VE	TAKE ER	DOD EVI			05101260
	6#4	GET	GETDO	3.(23)		GE		NUE LAI	L 1		95101270
		LH	RC . DCI	BLRECL		P T	K UP RECO	AD LENG	тн		05101200
		ST	R0.0(	24)		ANI	PASS IT	TO CALL	FR		05101200
		8	EXIT			60	EXIT TO C	ALLER			35101310
		FJECT									05101320
	*	PUT	R (	CALL	ING	SE	QUENO	C F		*	05101330
	*									*	QST01340
	*****	*****	*****	* * * * * *	*****	****	******	*****	* * * * * * * * * * *	******	05101350
	*									*	25101360
	*	CALL P	UTR (DI	DNAME, I	ND, ARR	RAY, NCI	1AR)			*	QSI01370
	*									*	05101380
	*	DDNAME	8	CHARACT	ER LIT	ERAL I	IR VARIABL	E WHICH	IS THE	*	QSI01390
	*		יספ	NAME FR	OM THE	E DD C	NRD OF THE	E DATA S	SET	*	QSI01400
	*		-							*	QSI01410
	*	ARPAY	AR	RAY FRD	M WHIC	H THE	RECORD IS	S WRITTE	EN .	*	QSID1420
	*									*	QSI01430
	*	NCHAR	IN	TEGER*4	VARIA	RE 0	CONSTANT	WHICH	IS THE	*	QSI01440
	XIC .		NU	MHER OF	CHARA	ICTERS	ID BE WRI	ITTEN		*	05101450

*         IND         INTFGGER*4 VAPIABLE.         THE VALUE PASSED BACK TD         *         GSIGIATE           *         *         *         *         *         *         GSIGIATE           *         *         *         *         *         GSIGIATE           *         *         *         *         GSIGIATE           *         *         *         GSIGIATE         *         GSIGIATE           *         *         *         *         GSIGIATE         *         GSIGIATE           *         *         *         *         *         GSIGIATE         *         GSIGIATE           *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *	xyx.				* QSI01460
THE CALLER INDICATES THE FOLLOWING         © 05101499           *         -3         NOT MORE THAN ONF DATA SET CAN BE OPENED AT         © 05101499           *         -3         NOT MORE THAN ONF DATA SET CAN BE OPENED AT         © 05101501           *         -2         DATA SET COULD NOT BE OPENED SUCCESSFULLY.         © 05101501           *         -2         DATA SET COULD NOT BE OPENED SUCCESSFULLY.         © 05101501           *         -2         DATA SET COULD NOT BE OPENED SUCCESSFULLY.         © 05101501           *         -2         DATA SET COULD NOT BE OPENED SUCCESSFULLY.         © 05101501           *         -2         DATA SET COULD NOT BE OPENED SUCCESSFULLY.         © 05101501           *         -1         NOT USFD         *         05101501           *         -1         NOT USFD         *         05101501           *         0         NO ERPORS WERE DETECTED         *         05101501           *         0         NO ERPORS WERE DETECTED         *         05101601           *         0         NO ERPORS WERE DETECTED         *         05101601           *         0         SIGI FAP         05101601         05101601           *         SENSE BYTES 0 AND I LEFT TO RIGHT IN IND         0	*	I NE	D INTEGER*4 VAPIA	BLE. THE VALUE PASSED BACK TO	* QSI01470
* -3 NOT MORE THAN ONE DATA SET CAN BE OPENED AT THE SAME TIME BY PUTR -2 DATA SET COULD NOT BE OPENED SUCCESSFULLY. PRIBABLY MEANS THAT DDNAME DID NOT CORRESPOND COULD NAME FROM DD CARD -1 NOT USFO -1 NOT USFO -1 NOT USFO -1 NOT USFO -1 NOT USFO -1 NOT REAR WERE DETECTED -1 NOT REAR WERE DETECTED -1 NOT REAR HAS OCCURRED. THE VALUE PASSED BACK. -1 NOT REAR HAS OCCURRED. THE VALUE PASSED BACK. -2 AN ERROR HAS OCCURRED. THE VALUE PASSED BACK. -3 NO ERRORS WERE DETECTED -4 OSIO1566 -5 CAN ERROR HAS OCCURRED. THE VALUE PASSED BACK. -5 CAN ERROR HAS OCCURRED. -5 CAN ERROR HAS OF OCURPUT. -5 CAN ERROR HAS OF OCUPUT. -5	*		THE CALLER INDI	CATES THE FOLLOWING	* QSI01480
<ul> <li>** ** ** ****************************</li></ul>	*				* QSI01490
*       THE SAME TIME RY PUTR       * 0SIG1510         *       -2       DATA SET COULD'NOT BE OPENED SUCCESSFULLY.       * 0SIG1520         *       TO DDNAME FROM DD CARD       * 0SIG1520         *       TO DDNAME FROM DD CARD       * 0SIG1520         *       -1       NOT USFO       * 0SIG1520         *       0       NO ERPORS WERE DETECTED       * 0SIG1520         *       0       NO ERPORS WERE DETECTED       * 0SIG1520         *       0       NO ERPORS WERE DETECTED       * 0SIG1620         *       *       0SIG1520       * 0SIG1620         *       YC       AN ERROR HAS OCCURRED. THE VALUE PASSED BACK.       * 0SIG1620         *       YC       AN ERROR HAS OCCURRED. THE VALUE PASSED BACK.       * 0SIG1620         *       YC       AN ERROR HAS OCCURRED. THE VALUE PASSED BACK.       * 0SIG1620         *       YC       AN ERROR HAS OCCURRED. THE VALUE PASSED BACK.       * 0SIG1620         *       YC       AN ERROR HAS OCCURRED. THE VALUE PASSED BACK.       * 0SIG1620         *       YC       AND 1. LEFT TO RIGHT IN IND       * 0SIG1620         *       YC       YC       ASIG1620       * 0SIG1620         *       YC       YC       YC	*	2788	3 NOT MORE THAN O	NE DATA SET CAN BE OPENED AT	* QSI01500
<ul> <li>* * * * * * * * * * * * * * * * * * *</li></ul>	*		THE SAME TIME B	Y PUTR	* QSI01510
<ul> <li>2 DATA SET COULD'NOT RE OPENED SUCCESSFULLY, # 05101536</li> <li>* TO DDNAME FROM DD CARD</li> <li>* TO DDNAME FROM DD CARD</li> <li>* O DOT USFD</li> <li>* O NO ERPORS WERE DETECTED</li> <li>* O SIGISTO</li> <li>* O SI</li></ul>	*			,	* 0SI01520
*         PROBABLY MEANS THAT DONAME DID NOT CORRESPOND         * 0510156           *         TO DONAME FROM DD CARD         * 0510156           *         -1         NOT USFD         * 0510156           *         0         NO ERPORS WERE DETECTED         * 0510156           *         0         NO ERPORS WERE DETECTED         * 0510156           *         0         NO ERPORS WERE DETECTED         * 0510163           *         >C         AN ERROR HAS OCCURRED, THE VALUE PASSED BACK         * 0510163           *         >C         AN ERROR HAS OCCURRED, THE VALUE PASSED BACK         * 0510163           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0510163           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0510163           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0510163           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0510163           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0510163           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0510163           *         STM RIARIZ,12(RI3)         0510163           *         STM RIARIZ,12(RI3)         0510163           *         STM RIARIZ,12(RI13)         0510150	*	****2	2 DATA SET COULD	NOT BE OPENED SUCCESSFULLY.	* QSI01530
*       TO DDNAME FROM DD CARD       * 0510156         *       -1       NDT USFD       * 0510156         *       0       NO ERRORS WERE DETECTED       * 0510156         *       0       NO ERRORS WERE DETECTED       * 0510156         *       >C       AN ERROR HAS OCCURRED. THE VALUE PASSED BACX.       * 0510160         *       >C       AN ERROR HAS OCCURRED. THE VALUE PASSED BACX.       * 0510160         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND       * 0510162         *       STIM R14.R12.12(R13)       SII0162       SII0162         *       STM R14.R12.12(R13)       SII0162       SII0162         *       STM R14.R12.12(R13)       SII0162       SII0162         USI	*		' PROBABLY MEANS	THAT DONAME DID NOT CORRESPOND	* QSI01540
<pre>* -1 NOT USED * 05101570 * 0</pre>	*		TO DDNAME FROM	DD CARD	* QSI01550
<ul> <li>-1 NDT USED</li> <li>* 0 NO ERPORS WERE DETECTED</li> <li>* 0 NO ERPORS WERE DETECTED</li> <li>* 0 SIDISEG</li> <li>* 20 AN ERROR HAS DECURRED. THE VALUE PASSED BACK.</li> <li>* 0SIDISEG</li> <li>* 21 THE CALLER IS STATUS BYTES 0 AND 1 AND</li> <li>* 0SIDISE</li> <li>* USING PUTR.PIS</li> <li>* 0SIDISE</li> <li>*</li></ul>	*				* QSI01560
<ul> <li>* 0 ND ERPORS WERE DETECTED</li> <li>* 0SIDISO</li> <li>* 0SIDISO</li></ul>	*	-1	NOT USED		* 0SID1570
* 0 ND ERPORS WERE DETECTED * 03101507 * >C AN ERROR HAS DCCURRED. THE VALUE PASSED BACK. * 031016107 * SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND * 031016307 * SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND * 031016307 * USING PUTP.P15 * 051016607 PUTP B P#1 STM R14.R12.12(R13) * 051016707 DC X14.CL5.PUTR. * 051016607 PUTP B P#1 STM R14.R12.12(R13) * 05101707 DEDP R15 * 05101707 PAL 96.1NIT INITIALIZE + SAVE AREA CHAIN ETC. 05101707 USING 0510.P12 * 05101707 PAL 96.1NIT SDCB POINT TO DCB 05101707 GSI01775 TM DCB0FLGS.**10* IS DCB DPEN? * 05101775 GC 1.P#2 * YES. BRANCH 05101770 MVC 0CBDDNAME.0(P1) * SAVE DDNAME TO DC3 05101707 MVC 0CBDDNAME.0(P1) * SAVE DDNAME TO DC3 05101707 MVC 0CBDFLGS.**10* IS DCB DPEN? * 05101707 MVC 0CBDFLGS.**10* MAS DPEN SUCCESSFUL? * 05101810 MVC PDDNAME.0(P1) * 010. MOVE DDNAME TO DC3 05101707 MVC 0CBFLGS.**10* MAS DPEN SUCCESSFUL? * 05101810 MVC PDDNAME.0(P1) DID CALLER CHANGE EDNAME? * 05101807 BC 1.P#2 * VS. TAKE ERROP EXIT * 05101807 P#2 CLC PDDNAME.0(P1) DID CALLER CHANGE EDNAME? * 05101807 P#4 L R0.1(R4) * PICK UP RECORD LENGTH * 05101807 P#4 L R0.1(R4) * PICK UP RECORD CALLER * 05101807 PUT PUTDC3.(R7) * 017 ARECORD LENGTH * 05101807 PUT PUTDC3.(R7) * 017 ARECORD LENGTH * 05101807 * FN D Q C A L L I N G S E Q U E N C F * 05101897 * * * * 00 Q C A L L I N G S E Q U E N C F * 05101897 * 05101895	*				* 05101580
<pre>* &gt;C AN ERROR HAS DCCURRED. THE VALUE PASSED BACK. # 0SID160C * TO THE CALLER IS STATUS BYTES 0 AND 1 AND # 0SID162C * SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND # 0SID162C * GSID162C * GSID162C</pre>	*	6	NO ERRORS WERE	DETECTED	* 05101500
*         >C         AN ERROR HAS OCCURRED. THE VALUE PASSED BACK.         GSIDIGC           *         TO THE CALLER IS STATUS BYTES 3 AND 1 AN3         QSIDIGC           *         TO THE CALLER IS STATUS BYTES 3 AND 1 AN3         QSIDIGC           *         SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND         *         QSIDIGC           *         TO THE CALLER IS STATUS BYTES 3 AND 1 AN3         *         QSIDIGC           *         SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND         *         QSIDIGC           *         SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND         *         QSIDIGC           *         USING PUTR.PIS         QSIDIGC         *         SIDIGC           PUTR         D #1         STM R14.R12.12(R13)         QSIDIGC         QSIDIGC           DGDP         R15         QSIDICC         QSIDICC         QSIDICC           P41         STM R14.R12.12(R13)         QSIDICC         QSIDICC           USING IHADC9.R15         OINT TO DCB         QSIDICC         QSIDICC           VE NG QSIDIA         AS.PUTDCB         OINT TO DCB         QSIDICC           USING IHADC9.R5         QSIDICC         QSIDICC         QSIDICC           VE OCADDNAM, O(R1)         NO. MOVE DONAME TO DC3         QSIDICC           MVC	*				* 05101600
*         TO THE CALLER IS STATUS BYTES 0 AND 1 AND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 0310120           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 03101400           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 03101400           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 03101400           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 03101400           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 03101400           *         SENSE BYTES 0 AND 1, LEFT TO RIGHT IN IND         * 03101400           *         # 05101700         OS101700         05101700           *         R 10, R12, R12, R12, R13)         R 05101700         R 05101700           *         C 05017, P12         YES, BRANCH         OS101700           *         R 0500,	*	>0	AN ERROR HAS OC	CURRED. THE VALUE PASSED BACK	* 05101500
*         SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND         * 0310163           *         SENSE BYTES 0 AND 1. LEFT TO RIGHT IN IND         * 0310163           *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *          *         *         *	*		TO THE CALLER I	S STATUS BYTES A AND 1 AND	+ 05101010
*         FUELON CONTEST AND IN LECTINO KIGHT IN TRO         *         GST0154C           *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         *         * <td< th=""><th>*</th><th></th><th>SENSE BYTES A A</th><th>NO 1. LEFT TO DIGHT IN IND</th><th>+ GSIDIOZO + OSIDIAZO</th></td<>	*		SENSE BYTES A A	NO 1. LEFT TO DIGHT IN IND	+ GSIDIOZO + OSIDIAZO
FJFCT       ************************************	**		JERGE OFFED U R	AN IN FULL IN KINHI IN IND	+ QSIU1030
USING PUTR.P15       05101660         PUTR       9x1       05101660         DC       X'4',CL5'PUTR'       05101660         P#1       STM       R14,R12,12(R13)       05101690         L       R12,LDPNT       05101700       05101700         DGDP       R15       05101710       05101710         USING 0SID,P12       05101710       05101720       05101720         PAL       R6,INIT       INITIALIZE = SAVE AREA CHAIN ETC.       05101740         USING 1HADCB,R5       05101740       05101760       05101760         TM       DCBDFLGS,X'10'       IS DCB OPEN?       05101760         MVC       DCBDRLGS,X'10'       IS DCB OPEN?       05101760         MVC       DCBDNAM,0(R1)       ND.       MOVE DDNAME       05101760         MVC       DCBDRLGS,X'10'       MAS DPEN SUCCESSFUL?       05101760         MVC       DCBDRLGS,X'10'       WAS DPEN SUCCESSFUL?       05101800         MVC       PODNAME,0(R1)       ND. TAKE EROP EXIT       05101800         BC       1,P#4       YES.BRANCH       05101800         MVC       PODNAME,0(R1)       ND. TAKE EROP EXIT       05101800         BC       1,P#4       YES.BRANCH       05101800 </th <th></th> <th>EIECT</th> <th></th> <th></th> <th>* 05101540</th>		EIECT			* 05101540
PUTR       DSING POTRATS       QSID1886       QSID1886         P#1       STM R14,R12,12(R13)       QSID1690         L       R12,LDPNT       QSID1700         DRDP       R15       QSID1700         USING 0510,P12       GSID1710       QSID1720         PAL       P6,INIT       INITIALIZE + SAVE AREA CHAIN ETC.       QSID1720         USING IHADC3,R5       OSID1740       QSID1750       QSID1760         USING IHADC4,R5       YES. BRANCH       QSID1760       QSID1760         MVC       DCBDPA8,5       YES. BRANCH       QSID1780         MVC       DCBDNAM.0(R1)       NG.* MOVE DDNAME TD DC3       QSID1780         MVC       PDENAME.0(R1)       SAVE DDNAME       QSID1800         MVC       PDENAME.0(R1)       SAVE DDNAME       QSID1780         MVC       PDENAME.0(R1)       SAVE DDNAME       QSID1780         MVC       DCBDPLAME.0(R1)       SAVE DDNAME       QSID1780         MVC       DCBDPLAME.0(R1)       SAVE DDNAME       QSID1780         MVC       DCBDPLAME.0(R1)       SAVE DDNAME       QSID1780         MVC       PDENAME.0(R1)       SAVE DDNAME       QSID1780         MVC       PDENAME.0(R1)       SAVE DDNAME       QSID18			0410 016		00101000
D       D       X+1       CLS <putr*< td="">       QSID1680         DC       X+4       CLS<putr*< td="">       QSID1680         P#1       STM<r14,r12,12(r13)< td="">       QSID1690         DRDP       R15       QSID1700         DRDP       R15       QSID1700         USING       QSID1710       QSID1700         USING       QSID1710       QSID1720         QAL       R5+PUTDCB       POINT TO DCB       QSID1740         USING       IHADC3,R5       QSID1760       QSID1770         MCDCDFLGS,X*10*       IS DCB OPEN?       QSID1770         MVC       DCBDPNAM,O(R1)       NO.* MOVE DDNAME TO DC3       QSID1770         MVC       PODNAME,O (R1)       SAVE DDNAME       QSID1780         MVC       PODNAME,O (R1)       SAVE DDNA</r14,r12,12(r13)<></putr*<></putr*<>	OUTO	05146			05101000
0.0       X14*, EL2.5 (2(R13))       0.5101690         0.5 DF DF R15       0.5101700       0.5101700         0.5 DF DF R15       0.5101700       0.5101700         0.5 DF R15       0.5101730       0.5101730         0.5 DF R15       0.5101801       0.5101801         0.5 DF R15	POIR	0			usi01670
D#1       SIM       R14+R12,12(R13)       0S101690         L       R12+LDPNT       0S101700         DEDP       R15       0S101700         USING       0S10,01700       0S101700         PAL       P64.1NIT       INITIALIZE = SAVE AREA CHAIN ETC.       0S101730         USING       0S101760       0S101760       0S101760         USING       IHADC3-R5       0S101760       0S101760         USING       IHADC3-R5       0S101760       0S101760         MVC       DCBDFLGS,X'10'       IS       DCB OPEN?       0S101760         MVC       DCBDNAME,0(R1)       N0+ MOVE DDNAME TD DC3       0S101780         MVC       PCBDRAME,0(R1)       SAVE DDNAME       0S101780         MVC       PCBDFLGS,X'10'       NAS DPEN SUCCESSFUL?       0S101780         MVC       PCBDFLGS,X'10'       NAS DPEN SUCCESSFUL?       0S101810         MVC       PUTDC3+(0UTPUT)       OPEN SUCCESSFUL?       0S101810         MVC       PUTDAG+(PUTDC3+(CP1)       DID CALLER CHANGE EXIT       0S101810         MVC       PUDNAME,0(P1)       DID CALLER CHANGE ENTT       0S101830         MVC       PUDNAME,0(P1)       DID CALLER CHANGE ENTT       0S101830         P#4	0.41	OC C			QS101680
L       R12.LDDNT       OSID170C         DFDP       R15       OSID170C         USING       OSID1.P12       INITIALIZE = SAVE AREA CHAIN ETC.       OSID172C         PAL       P6.INT       INITIALIZE = SAVE AREA CHAIN ETC.       OSID172C         PAL       P6.INT       INITIALIZE = SAVE AREA CHAIN ETC.       OSID172C         PAL       P6.INT       INITIALIZE = SAVE AREA CHAIN ETC.       OSID172C         PAL       P6.INT       INITIALIZE = SAVE AREA CHAIN ETC.       OSID172C         USING       IHADCB.R5       OSID177C       OSID175C         USING       IHADCB.R5       OSID175C       OSID175C         TM       DCBDENDNAM.O(R1)       NO       MOVE DDNAME TD DCB       OSID175C         MVC       DCRDDNAME,O(R1)       NO       MOVE DDNAME TD DCB       OSID175C         MVC       DCRDFLGS.X'10'       NAS DPEN SUCCESSFUL?       OSID178C         MVC       PDDNAME,O(R1)       ND       TM SUCCESSFUL?       OSID178C         MVC       PDENFLGS.X'10'       WAS DPEN SUCCESSFUL?       OSID180C         MVC       PUTDCB.(CP1)       DID CALLER CHANGE DDNAME?       OSID182C         BNE       EP#3       YES. TAKE ERROP EXIT       OSID185C         P#4	P#1	SIM	R14, R12, 12(R13)		05101690
0400       R15       05101710         USING 0510,P12       05101720       05101720         PAL       P6,INIT       INITIALIZE = SAVE AREA CHAIN ETC.       05101730         LA       R5,PUTDCE       PDINT TO DCB       05101730         USING IHADCB,R5       05101760       05101760         TM       DCBDFLGS,X*10*       IS DCB OPEN?       05101760         BC       1,P#2       YES. BRANCH       05101780         MVC       DCBDDNAM,0(R1)       N0 MOVE DDNAME TD DC3       05101780         MVC       DCBDFLGS,X*10*       NSAVE DDNAME       05101780         MVC       DCBDNAME,0(R1)       N0 MOVE DDNAME TD DC3       05101780         MVC       DCBDNAME,0(R1)       N0 MOVE DDNAME       05101790         MVC       DCBDNAME,0(R1)       N0 TAKE ERCOP EXIT       05101800         BVE       EP#2       N0 TAKE ERCOP EXIT       05101830         P#4       L       R0,0(244)       PICK UP RECORD LENGTH       05101800         <		L	RIZILDENI		QSI01700
05100 0510.012       05101720       05101720         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101740         05101 700 050       05101740       05101750         05101 700 050       05101740       05101750         05101 700 050       05101740       05101750         05101 700 050       05101750       05101750         05101 700 050       05101750       05101750         05101 700 050       05101750       05101750         0700 05000       05101750       05101750         0710000       0500000       05101750         07100000       05000000       05101750         0710000000       050000000       05101800         0710000000000000       0500000000       05101800         07100000000000000000000000000000000000		DEDD	R15 .		QSI01710
PALP6,INITINITIALIZESAVE AREA CHAIN ETC.OSI01730IAR5,PUTDCBPOINT TO DCBOSI01740USING IHADCB,R5OSI01750TMDCBDFLGS,X'10'IS DCB DPEN?OSI01760BC1,P#2YES. BRANCHOSI017760MVCDCBDDNAM,O(R1)NO.MOVE DDNAME TO DCBOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCPDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCDDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCDDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCDDDNAME,0(R1)NO.MOVE DDNAMEOSI017760MVCDDDNAME,0(R1)NO.SOUTPUTOSI01800MVCDDDNAME,0(R1)NO.SOUTPUTOSI01800MVCDDDNAME,0(R1)NO.SOUTPUTOSI01800MVCDDMAME,0(R1)DV.TAKE ERROP EXITOSI01800BNEEP#3YES.TAKE ERROP EXITOSI01830P#4LR0.2(R4)PICK UP RECORD LENGTHOSI01860PWTPUTDC3.(R3)PUT A RECORDQSI01890BNEFN D QC A L L I N GS E Q U		USING	Q\$10,812 ·	· · · · · · · · · · · · · · · · · · ·	QSI01720
LA       R5,PUTDCB       PDINT TO DCB       OSID1740         USING IHADCB,R5       DSID1750         TM       DCBDFLGS,X'10'       IS DCB OPEN?       OSID1750         BC       1,P#2       YES. BRANCH       OSID1760         MVC       DCBDDNAM,J(R1)       N3. MOVE DDNAME TD DC3       OSID1780         MVC       PDDNAME,0(R1)       SAVE DDNAME       OC3       OSID1780         MVC       PDDNAME,0(R1)       SAVE DDNAME       OSID1780       OSID1780         MVC       PUTDC3,(0UTPUT)       OPEN SUCCESSFUL?       OSID1810       OSID1810         MVC       PUTDC3,(R2)       NO. TAKE ERCOP EXIT       OSID1810       OSID1830         P#2       CLC       PDDNAME,0(P1)       DID CALLER CHANGE DDNAME?       OSID1840         P#4       L       R0,0C3LRFCL		PAL	R6,INIT	INITIALIZE - SAVE AREA CHAIN ETC.	QSIC1730
USING IHADCB,R5       05101750         TM       DCBDFLGS,X*10*       IS DCB DPEN?       05101750         BC       1,P#2       YES. BRANCH       05101770         MVC       DCBDDNAM.0(R1)       N3 MDVE DDNAME TD DC3       05101780         MVC       PDDNAME,0(R1)       SAVE DDNAME       05101790         MVC       PDDNAME,0(R1)       SAVE DDNAME       05101810         MVC       PUTDC3.(0UTPUT)       OPEN SUCCESSFUL?       05101810         BC       1.P#4       YES. BPANCH       05101820         BNE       EP#2       NO.TAKE EROP EXIT       05101830         BNE       EP#3       YES. TAKE EROP EXIT       05101830         P#4       L       RC.2(R3)       PICK UP RECORD LENGTH       05101800         BUT PUTDC3.(R3)       P		LA	R5, PUTDCB	POINT TO DCB	<b>OSIN1740</b>
TM       DCBOFLGS, X*10*       IS DCB OPEN?       OSI01760         BC       1, P#2       YES, BRANCH       OSI01770         MVC       DCBDDNAM, O(R1)       NO. MOVE DDNAME TO DCB       OSI01780         MVC       PDDNAME, 0(R1)       SAVE DDNAME       OSI01790         OPEN       (PUTDCB, (OUTPUT))       OPEN DCB FOR DUTPUT       OSI01780         DPEN       (PUTDCB, (OUTPUT))       OPEN DCB FOR DUTPUT       OSI01800         TM       DCBOFLGS, X*12*       WAS OPEN SUCCESSFUL?       OSI01800         DF       PEN (PUTDCB, (OUTPUT))       OPEN SUCCESSFUL?       OSI01820         BC       1, P#4       YES, BPANCH       QSI01820         BC       1, P#4       YES, TAKE ERROR EXIT       QSI01820         BNE       EP#3       YES, TAKE ERROR EXIT       QSI01830         BNE       EP#3       YES, TAKE ERROR EXIT       QSI01850         P#4       L       R0, 0(R4)       PICK UP RECORD LENGTH       QSI01830         BN       FXIT       GO. EXIT TO CALLER       QSI0		US ING	IHADCB,R5		QSI01750
BC       1.P#2       YES. BRANCH       QSID1770         MVC       DCBDDNAM.J(R1)       N3 MOVE DDNAME TD DC3       QSID1780         MVC       PDDNAME.O(R1)       SAVE DDNAME       QSID1780         BC       1.P#4       YES.FRANCH       QSID1800         BC       1.P#4       YES.BRANCH       QSID1830         P#2       CLC       PDNAME.O(P1)       DID CALLER CHANGE DDNAME?       QSID1830         P#4       L       R0.O(R4)       YES.TAKE EROR EXIT       QSID1850         P#4       L       R0.O(R4)       PICK UP RECORD LENGTH       QSID1840         PUT       PUTOC3.(R3)       PUT A RECORD		TM	DCBOFLGS,X*10*	IS DCB OPEN?	QSI01760
MVC       DCBDDNAM.J(R1)       NO MOVE DDNAME TD DCB       QSI01780         MVC       PDDNAME,0(R1)       SAVE DDNAME       DCB         DPEN       (PUTDCB.(QUTPUT))       OPEN DCB FOR DUTPUT       QSI01810         DPEN       (PUTDCB.(QUTPUT))       OPEN SUCCESSFUL?       QSI01810         DCB.1.P#4       YES. BPANCH       QSI01830         BC       1.P#4       YES. BPANCH       QSI01830         P#2       CLC       PDDNAME.O(P1)       DID CALLER CHANGE DDNAME?       QSI01830         D#4       EP#3       YES. TAKE ERROP EXIT       QSI01860         BNE       EP#3       YES. TAKE ERROR EXIT       QSI01860         P#4       R0.0(R4)       PICK UP RECORD LENGTH       QSI01860         PUT       PUTDCB.(R7)       PUT A RECORD       QSI01880         PUT       PUTDCB.(R7)       PUT A RECORD       QSI01880         R       FXIT       GD EXIT TO CALLER       QSI01891         *       F N D Q C A L L I N G S E Q U E N C F       * QSI01892         *       *       *       ASI01892         *       *       *       *       QSI01894         *       *       *       *       QSI01894         *       * </th <th></th> <th>BC</th> <th>1.P#2</th> <th>YES. BRANCH</th> <th>QSI01770</th>		BC	1.P#2	YES. BRANCH	QSI01770
MVC       PDDNAME;0(R1)       SAVE DDNAME       QSI01790         OPEN       (PUTDC3,(OUTPUT))       OPEN DCB FOR DUTPUT       QSI01800         TM       DCBOFLGS,X'10'       WAS DPEN SUCCESSFUL?       QSI01820         BC       1,P#4       YES, BRANCH       QSI01820         BC       1,P#4       YES, BRANCH       QSI01820         BC       1,P#4       YES, BRANCH       QSI01820         P#2       CLC       PDDNAME;0(P1)       DID CALLER CHANGE DDNAME?       QSI01830         P#2       CLC       PDDNAME;0(P1)       DID CALLER CHANGE DDNAME?       QSI01830         P#4       L       R0;0(R4)       PICK UP RECORD LENGTH       QSI01860         PUT       PUTDC3;(R7)       PUT A RECORD       QSI01860         PUT       PUTDC3;(R7)       PUT A RECORD       QSI01870         QSI01890       GD_EXIT TO CALLER       QSI01890         R       FXIT       GD_EXIT TO CALLER       QSI01892         *       FN D Q       C A L L I N G       S E Q U E N C F       * QSI01892         *       *       QSI01895       * QSI01895       *		MV C	DCBDDNAM, O(R1)	ND MOVE DDNAME TO DCB	05101780
OPEN (PUTDC3.(OUTPUT))       OPEN DCB FOR DUTPUT       OSI01800         TM       DCBOFLGS.X*10*       WAS DPEN SUCCESSFUL?       OSI01810         BC       1.P#4       YFS. BPANCH       QSI01820         BC       1.P#4       YFS. BPANCH       QSI01820         BC       1.P#4       YFS. BPANCH       QSI01820         P#2       CLC       PDDNAMF.0(P1)       DID CALLER CHANGE DDNAME?       QSI01830         BNE       EP#3       YES. TAKE ERROR EXIT       QSI01850         P#4       L       R0.0(R4)       PICK UP RECORD LENGTH       QSI01860         PUT       PUTDC3.(R3)       PUT A RECORD       QSI01880       QSI01880         PUT       PUTDC3.(R3)       PUT A RECORD       QSI01880       QSI01890         R       FYIT       GD. EXIT TO CALLER       QSI01890         *       FN D Q       C A L L I N G       S E Q U E N C F       * QSI01892         *       *       FN D Q       C A L L I N G       S E Q U E N C F       * QSI01893         *       *       *       SI01895       * QSI01895       * QSI01895		MVC	PDDNAME, 0 (R1)	SAVE DDNAME	QS101790
TM       DCBOFLGS * X*10*       WAS OPEN SUCCESSFUL?       QSI01810         BC       1,P#4       YES, BPANCH       QSI01820         E       EP#2       NO • TAKE ERROP EXIT       QSI01830         P#2       CLC       PDDNAME, 0(P1)       DID CALLER CHANGE DDNAME?       QSI01830         P#2       CLC       PDDNAME, 0(P1)       DID CALLER CHANGE DDNAME?       QSI01830         P#4       L       R0 • 0(R4)       YES, TAKE ERROR EXIT       QSI01860         STH       R0 • 0CR4)       PICK UP RECORD LENGTH       QSI01860         STH       R0 • 0CR4)       PUT A RECORD       QSI01860         PUT       PUTOCB, (R7)       PUT A RECORD       QSI01890         PUT       FXIT       GD EXIT TO CALLER       QSI01890         PX4       FN D Q       C A L L I N G       S E Q U E N C F       4 QSI01892         *       FN D Q       C A L L I N G       S E Q U E N C F       4 QSI01893         *       *       QSI01895       *       4 QSI01895         *       *       *       *       *		0° EN	(PUTDC3,(OUTPUT))	OPEN DCB FOR DUTPUT	QST 01800
BC       1,P#4       YES, BPANCH       QSI01820         B       EP#2       NO., TAKE EROP EXIT       QSI01830         P#2       CLC       PDDNAME, 0(P1)       DID CALLER CHANGE DDNAME?       QSI01840         BNE       EP#3       YES, TAKE EROP EXIT       QSI01850         P#4       L       R0, 0(R4)       PICK UP RECORD LENGTH       QSI01860         STH       R0, 0C3LRECL       AND STORE IT IN DC3       QSI01880         PUT       PUTDCB, (R3)       PUT A RECORD       QSI01880         PUT       EJECT       GD. EXIT TO CALLER       QSI01892         *       F N D Q       C A L L I N G       S E Q U E N C F       * QSI01893         *       *       QSI01893       * QSI01895       * QSI01895         *       *       *       SI01895       * QSI01895		TM	DCBOFLGS,X*10*	WAS DPEN SUCCESSFUL?	QSI01810
B       EP#2       NO TAKE ERROP EXIT       QSI01830         P#2       CLC       PDDNAME, 0(P1)       DID CALLER CHANGE DDNAME?       QSI01840         BNE       EP#3       YES, TAKE ERROR EXIT       QSI01850         P#4       L       R0.0(R4)       PICK UP RECORD LENGTH       QSI01860         STH       R0.0C3LRECL       AND STORE IT IN DC3       QSI01860         PUT       PUTDC3.(R3)       PUT A RECORD       QSI01890         B       FXIT       GD. EXIT TO CALLER       QSI01890         B       FXIT       GD. EXIT TO CALLER       QSI01890         *       F N D Q       C A L L I N G       S E Q U E N C F       * QSI01892         *       *       *       *       QSI01893         *       *       *       *       QSI01893		вC	1.0#4	YES, BRANCH	QSI01820
P#2       CLC       PDDNAMF, 0 (P1)       DID CALLER CHANGE DDNAME?       OSID1840         BNE       EP#3       YES, TAKE EROR EXIT       OSID1850         P#4       L       R0, 0 (R4)       PICK UP RECORD LENGTH       OSID1860         STH       R0, 0 C3LRECL       AND STORE IT IN DC3       OSID1880         PUT       PUTDCB, (R3)       PUT A RECORD       OSID1880         B       FXIT       GD. EXIT TO CALLER       OSID1890         EJECT       GD. EXIT TO CALLER       OSID1892         *       F N D Q       C A L L I N G       S E Q U E N C F       * OSID1892         *       *       GSID1893       * OSID1893         *       *       *       OSID1895		F.	EP#2	ND TAKE ERROR EXIT	QSI01830
BNE       EP#3       YES, TAKE ERROR EXIT       OSIO1850         P#4       L       R0,0(R4)       PICK UP RECORD LENGTH       OSIO1860         STH       RC,0C3LRECL       AND STORE IT IN DC3       OSIO1870         PUT       PUTDC3,(R3)       PUT A RECORD       OSIO1880         B       FXIT       GO. EXIT TO CALLER       OSIO1891         *       FNDQCALLINGSEQUENCE       * OSIO1892         *       FNDQCALLINGSEQUENCE       * OSIO1893         *       *       SEQUENCE       * OSIO1893         *       *       OSIO1893       * OSIO1893         *       *       *       OSIO1893         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       * <th>D#?</th> <th>CLC</th> <th>PDDNAME. C(P1)</th> <th>DID CALLER CHANGE DONAME?</th> <th>05101840</th>	D#?	CLC	PDDNAME. C(P1)	DID CALLER CHANGE DONAME?	05101840
P#4       L       R0,0(R4)       PICK UP RECORD LENGTH       QSI01860         STH       RC,0C3LRECL       AND STORE IT IN DC3       QSI01870         PUT       PUTOC3,(R3)       PUT A RECORD       QSI01880         B       FXIT       GO_EXIT TO CALLER       QSI01891         EJECT       SEQUENCE       * QSI01892       *         *       FNDQCALLINGSEQUENCE       * QSI01893         *       *       QSI01893       *         *       *       *       QSI01893         *       *       *       QSI01893         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *         *       *       *       *		BNE	FD#3	YES. TAKE FRROR EXIT	05101850
STH       RC.DC3LRECL       AND STORE IT IN DC3       QSI01870         PUT       PUTDC3.(R3)       PUT A RECORD       QSI01880         R       FXIT       GO.EXIT TO CALLER       QSI01891         EJECT       SEQUENCE       * QSI01892       * QSI01893         *       FNDQCALLINGSEQUENCE       * QSI01893         *       FNDQCALLINGSEQUENCE       * QSI01893         *       STORE IT TO CALLER       * QSI01893         *       SIO187       * QSI01893         *       SIO1894       * QSI01894	D#4	L	R0.2(R4)	PICK UP RECORD LENGTH	05101860
PUT       PUT OCG, (R3)       PUT A RECORD       QSID1880         R       FXIT       GD. EXIT TO CALLER       QSID1890         EJECT       QSID1891       4       SID1892       4         *       FNDQCALLINGSEQUENCF       *       QSID1892         *       FNDQCALLINGSEQUENCF       *       QSID1892         *       *       QSID1893       *       QSID1893         *       *       QSID1893       *       *       QSID1893         *       *       *       QSID1893       *       *       QSID1893         *       *       *       *       QSID1893       *       *         *       *       *       *       QSID1893       *       *       *       QSID1893         *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       *       * <th>- 1</th> <th>STH</th> <th>BC. DC31 BECI</th> <th>AND STORE IT IN DCB</th> <th>05101870</th>	- 1	STH	BC. DC31 BECI	AND STORE IT IN DCB	05101870
B       FXIT       GD_EXIT_TO_CALLER       QSI01890         EJECT       QSI01891         *       FNDQ_CALLING_SEQUENCF       * QSI01892         *       * QSI01893         *       * QSI01895		PUT	PHTO(B, (R3))	PUT A RECORD	05101880
EJECT GST01891 * FNDQ CALLING SEQUENCE * QST01891 * * * * * * * * * * * * * * * * * * *		R	EXIT	GO EXIT TO CALLER	05101800
*       FNDQCALLING SEQUENCE       * QSI01892         *       * QSI01893         *       * QSI01894         *       * QSI01894         *       * QSI01895		FIFCT			05101801
*       *       GS101892         *       *       QS101893         *       *       SI01893         *       *       *         *       *       SI01893         *       *       *         *       *       SI01894         *       *       *         SI01894       *       *         *       *       *         SI01895       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *       *       *         *	*	END	O CALLENG	SEQUENCE	* 05101892
~ \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\				uz van van van van van van van van van v	* 05101092
* QSI01895	مەرىپ بەرىپ بەرىپ	* * * * * * * *	******	****	
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	75				- ADIOI0AD

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*	CALL	ENDQ (DDNAME . IND. OPTIC)N)	05101896
*			*	05101897
*	DDNAME	8 CHARACTER LITER	AL OR VARIABLE WHICH IS THE *	05101898
*		DDNAME FROM THE D	D CARD OF THE DATA SET *	05101899
*			*	05101000
*	IN) INTEGER*4 VARIABL	E. THE VALUE PASSED BACK TO *	05101900
*		THE CALLER INDICA	TES THE FOLLOWING *	05101901
*		•	*	05101902
*	- 2	2 ' DDNAME DOES NOT C	ORRESPOND TO A DATA SET THAT	05101904
*		WAS PREVIDUSLY OF	ENED *	05101005
*			· · · · · · · · · · · · · · · · · · ·	05101006
*	C	DATA SET HAS BEEN	L CLOSED *	051019007
*			* ***********	05101907
*	OPTION	THE LITERAL PREWI	NOT OR TEAVET OR A VARIABLE +	05101900
*		CONTAINING THE CH	ARACTERS REWIND OR EAVE	05101909
*				05101910
*		REWIND . POSITION	DATA SET AT RECTNISTIC	05101911
*		LEAVE - POSITION	DATA SET AT END	05101912
*		C. A.C. = 10011104		02101913
* NOTE *	***	TE THE DATA SET T		QS101914
*	يوانه ساهه د	LAS NO EFFECT	S ALREADT CLUSED THEN OPTION *	05101915
سايد			TED A CALL TO ENDO TO MASS	05101916
*		WITH LEAVE AND LA	YER A CALL TO ENDO IS MADE *	QSI01917
بد		WITH PEWIND # THE	JATA SET WILL NUT BE PUSITIONED *	QSI01918
AL.		AT THE BEGINNING	*	QSI 01919
د. به بای بای بای بای بای مای مای	فسيلم بالد مانة بالدياد بالد ما		*	QSI01920
* * * * * * * *	· · · · · · · · · · · · · · · · · · ·	*****	* * * * * * * * * * * * * * * * * * * *	QSI01921
	EJECT			05101922
EN00	USING	ENDQ.RI5		QSI01923
ENDO	H	E#1		QSI01924
	00	X'4', CL5'ENDO'		QSI 01930
- * 1	SIM	R14, R12, 12(R13)		QSI01940
	L	R12,LOPNT		QSI01950
	DROP	R15		QSI 01960
	USING	Q510,R12		QSI01970
	BAL	R6,INIT	INITIALIZE - SAVE AREA CHAIN ETC.	QSIN1980
	US ING	IHADCU,R5		QSI01990
	LA	P5, PUTDCB	POINT TO DCR	QSI 02200
	CL C	PDDNAME, (R1)	CLOSE THIS ONE?	QST02010
	PF	E#2	YES. BRANCH	25102020
	LA	R5.GETDCB	NO. POINT TO OTHER DCB	05102030
	CL C	GDDNAME . 0 (R1)	CLOSE THIS ONE?	05102040
	BNE	EP#2	ND. TAKE FROM EXIT	05102050
E#2	ТМ	DCBOFLGS.X.101	IS DCB OPEN?	05102050
	BC	8.FXIT	NO. BRANCH	05102070
	čí c	0(6.83) = CIREWIND!	YES. DOES HE WANT TO DEWIND?	05102070
	BE	- こくすいひょうかん 小山市 よけい	YES, BRANCH	ACT02000
		((BS), LEAVE)	NO. CLOSE WITH LEAVE OPTION	05102190
	P	FXIT	SO EVIT TO CALLED	05102100
F#4	CLASE	((RS), REPEAD)	CLOSE WITH DEREAD	OSTOSIOC
and the second		A. A. A. M. P. P. 1984, 10 June 1972, P.	And the start of t	USI CICU

	B	EXIT	GO EXIT TO CALLER	QS102130 QS102140
INIT	USING LR LA ST ST LM SR ST BR	QSID,R12 R11,R13 R13,SA R13,B(R11) R11,4(R13) R1,R4,0(R1) R0,P0 R0,0(R2) R6	SAVE CALLER'S SA POINTER INITIALIZE NEW SA POINTER CHAIN SAVEAREAS LOAD PARAMETER POINTERS ZERO TO CALLER'S ERPOR INDICATOR LOCAL RETURN	QSID2150 QSID2160 QSID2170 QSID2180 QSID2190 QSID2200 QSID2210 QSID2220 QSID2220
*	ERROR	EXIT #2	DCB FAILED TO OPEN SUCCESSFULLY	QS102240 QS102250
* ER#2	LA B	R0,2 ER#4	SET ERROR INDICATOR = 2 GO MAKE IT NEGATIVE	QS102280 QS102280 QS102280
*	ERROR	EXIT #3	DDNAME CHANGE WHILE DCB WAS DPEN	QSI02300 QSI02310
₩ E9.#3 E9.#4	LA LNR ST	RC,3 RC,R0 RC,0(R2)	SET ERROR INDICATOR = 3 Make error indicator negative and pass to caller	QS102320 QS102330 QS102340
* *	EXIT	TO CALLER		QSI02350 QSI02360 QSI02370
FXIT	LR LM MVI BR EJECT	R13,R11 R14,R12,12(P13) 12(R13),X*FF* R14	RESTORE CALLER'S SA POINTER RESTORE REGISTERS INDICATE RETURN FXIT TO CALLER	QS102380 QS102390 QS102390 QS102400 QS102410 QS102420 QS102430
*	EODAD	ROUTINE		QSI02440 QSI02440
ĚOFX +	LA B	RC • 1 EF#4	SET ERROR INDICATOR = 1 GD_MAKE_IT_NEGATIVE_AND_EXIT	QSIN2460 QSIN2470 QSIN2480
*	SYNAD	ROUTINE		QSI02490 QSI02500
ERRX	LR MVC MVC BR	R1,R0 0(2,R2),12(R1) 2(2,R2),2(R1) R14	POINT TO STATUS INDICATOR AREA MOVE STATUS D & 1 TO CALLERS IND MOVE SENSE D & 1 TO CALLERS IND EXIT TO IOS	QS102510 QS102520 QS102530 QS102540 QS102550
* SA GDDN AME PDDNAME GFTDCB	EJECT DC DC DC DC DC DCB	A(QSID) 18F10 CL 8' CL 8' DSORG=PS,DEVD=DA,SYN	ADDRESS OF LOAD POINT HAD=ERRX,MACRE=(GM),EODAD=EOFX,	QSI02560 QSI02570 QSI02580 QSI02590 QSI02600 XQSI02610

,

EROPT=ACC QSI02620 PUTDCB DCB DSORG=PS, DEVD=DA, SYNAD=ERRX, MACRF=(PM) QSI02630 EJECT 95102640 DCBD DSORG=(QS),DEVD=(DA) QS102650 END **OSI02660** 1* //STEP2 EXEC FORTGOLG //FORT.SYSIN DD * DOUBLE PRECISION DDNM(50) INTEGER*2 DATA(2000) 1=1 IBD=0IBLK=0 READ(5,500) NEILE READ(5,501) (DDNM(J), J=1, NFILE) 1 CONTINUE IBLK=IBLK+1 CALL GETP(DDNM(I), ITST, DATA, ILNG) IF (ITST) 2.4.3 2 IF (ITST .FQ.-1) GO TO 6 WRITE (6,600) ITST, DDNM(I) STOD 3 IF (IBD .GT.2) GD TO 1 IB0=IBD+1 IBLK=IBLK-1 BACKSPACE 1 WRITE (6,601) IBD, DDNM(I) GC TO 1 4 IL=ILNG/2 TPD=1 JS=25 JL=DATA(JS) JDM=DATA(JS+1) JE=JS+JL=1 IF (JE .GT.IL) GO TO 1 IF (JDM .EQ.O .OR. JDM .EQ.5) CALL LIST(DATA, JS+4, JE) IF (JL .GT. 120) GP TO 7 IF (DATA(JS+1) .LT.) .OP. DATA(JS+1) .GT.2) GO TO 7 C WRITE (2,200) (DATA(N), N=JS, JE) IF (JE .EQ.IL) GU TO 1 JS=JE+1GO TO 5 6 CALL ENDQ(DDNM(I), ITST, 'LEAVE') IBLK=0 I = I + 1IF (I .GT. NFILE) STOP GD TO 1 7 WRITE (6,602) IBLK, NFILE GO TO 1

```
500 FORMAT (15)
501 FORMAT (8(A8,2X))
500 FORMAT (* RETRY:*,12,* FILE:*,48)
601 FORMAT (' READ ERROR: ', 15, ' FILE: ', A8)
FND
    SUBROUTINE LIST(I, JU, KU)
    INTEGER*2L(128)/0,1,2,3,55,45,46,47,22,5,37,11,12,13,14,15,16,17,
   >18,18,60,61,50,38,24,25,63,39,34,34,53,53,64,90,127,123,91,108,
   >80,125,77,93,92,78,107,96,75,97,240,241,242,243,244,245,246,247,
   >248.249.122.94.76.126.110.111.124.193.194.195.195.197.198.199.
   >200,201,209,210,211,212,213,214,215,216,217,226,227,228,229,230,
  >231,232,233,192,0,208,0,0,121,27*0,250,0,204,7/
    INTEGER*2 I(2000). C(2), IB(55)
   CALL CNVRT(ITM, I(JU=2), I(JU=1))
    IB(2) = I(JU-3)
   J=4
   TA=KU=JU+5
    IH=ITM/360000
    IM=IT M/6000-IH*60
   DC 18 11=JU.KU
   J=J+1
   CALL DEPAK(I(I1),C)
   IF ( C(1) •GE• 128 •OR•C(2)•GE• 128) GD TO 4
   TB(J) = 256 * (C(1) + 1) + (C(2) + 1)
   IF (C(1).NE.13) GO TO 16
   IP(J)=0
   GO TO 19
16 IF(C(2).NE.13) GO TO 17
   IB(J) = L(C(1)+1) * 256
   GO TO 19
17 CONTINUE
18 CONTINUE
19 IF (J \cdot GT \cdot IA) = IA
   IF (J .GT.50) J=50
    JD=J=4
   IF (ITM .EQ. 0) RETURN
   WRITE (6,600) IE(2), IH, IM, (IB(<), K=5, J)
600 FORMAT (10X, "TYPE: ",12," AT ",12,": ',12," HOURS. ',50A2)
 4 PETURN
   END
   SUBPOUTINE CNVRT (I, IH, IL)
   INTEGER*2 IH.IL
   I=IL
   IF (I .LT.^) I=I+65536
   I=I+65536*1H
   RETURN
   FND
   SUBPOUTINE DEPAK(I,J)
```

```
INTEGER*2 I, J(2), K(2)
      LOGICAL*1 A(4)
      EQUIVALENCE (K, A)
      K(1) = I
      K(2)=0
      A(4) = A(1)
      A(1) = A(3)
      J(1) = K(1)
      J(2) = K(2)
      RETURN
      END
//GO.DUMMY DD DUMMY
//FT01F001 DD UNIT=TAPE9.VOL=SER=Z73893.DISP=(OLD.KEEP).
         LABEL=(1,NL,,IN),DCB=(LRFC_=3200,BLKSIZE=3200,DEN=2,RECFM=U)
11
//FT01F002 DD UNIT=TAPE9,VOL=SER=Z73993,
         DISP=(OLD, KEEP), LABEL=(2, N_,, IN), DCB=(*, FT01F001)
11
//FT01E003 DD UNIT=TAPE9,VOL=SER=Z73893,
11
         DISP=(DLD,KEEP),LABEL=(3,NL,,IN),DCB=(*,FT01F001)
//FT01F004 DD UNIT=TAPE9,VDL=SER=ZZ3893,
11
         DISP=(OLD, KEEP), LABEL=(4, NL,, IN), DCB=(*, FT01F001)
//FTALEOAS DO UNIT=TAPEA,VOL=SER=Z73893.
         DISP=(DLD, KEEP), LABEL=(5, NL,, IN), DCB=(*, FT01F001)
11
//FTO1FOC6 DD UNIT=TAPE9.VOL=SER=723893.
         DISP=(DLD,KEEP),LABEL=(6,NL,,IN),DCB=(*,FT01F001)
11
//FT01F007 DD UNIT=TAPE9,VOL=SER=ZZ3893,
11
         DISP=(OLD,KEEP),LABFL=(7,N_,,IN),DCB=(*,FT01F001)
//FTO1E008 DD UNIT=TAPE9;VOL=SEP=Z73893.
11
         DISP=(OLD, KEEP), LABEL=(8, NL,, IN), DCB=(*, FT01F001)
//FT01F009 DD UNIT=TAPF0,VDL=SFP=Z73893,
11
         DISP=(OLD,KEFP),LABEL=(9,NL,,IN),DC9=(*,FT01F001)
//FT01F010 DD UNIT=TAPE9.VOL=SER=Z73893.
         DISP=(OLD.KEEP),LABEL=(10,NL,,IN),DCB=(*.FT01=001)
11
//FT01F011 DD UNIT=TAPE9,VOL=SER=ZZ3393,
11
         DISP=(OLD,KEEP),LABEL=(11,NL,,IN),DC3=(*,FT01=001)
//FT01F012 DD UNIT=TAPE9,VOL=SFR=Z73893,
11
         DISP=(OLD.KEEP).LABEL=(12,NL,,IN),DCB=(*.FT01F001)
//FTO1FC13 DD UNIT=TAPE9, VOL=SFR=ZZ3893,
11
         DISP=(OLD,KEEP),LABEL=(13,NL,,IN),DCB=(*,FT01F001)
//FT01F014 DD UNIT=TAPE9,VOL=SEP=Z73893,
         DISP=(OLD, KEEP), LABEL=(14, NL, , IN), DCB=(*, FT01F001)
11
//FT01F015 DD UNIT=TAPE9,VDL=SEP=Z73893,
11
         DISP=(OLD,KEEP),LABEL=(15,NL,,IN),DCB=(*,FT01F001)
//FT01F016 DD UNIT=TAPE9.VOL=SER=ZZ3893,
11
         DISP=(DLD,KEEP),LABEL=(16,NL,,IN),DC3=(*,FT01=001)
//FTA1EC17 DD UNIT=TAPE9.VOL=SER=ZZ3893.
11
        DISP=(JLD.KEEP),LABEL=(17,NL,,IN),DCB=(*,FT01F001)
//FT01F018 DD UNIT=TAPE9, VOL=SEP=ZZ3893,
11
         DISP=(OLD, KFEP), LABFL=(18, NL,, IN), DCB=(*, FT01F001)
//GC.SYSIN DD *
```

18							
FTOIF001	FT01F002	FT01F003	FT01F004	FTC1F005	FT01=006	FT01F007	FT01F008
FT01F009	FT01F010	FT01F011	FT01F012	FT01F013	FT01=014	FT01F015	FT01F016
FTCIFC17	FT01F018	FT01F019	FT01F020	FT01F021	FT01F022	FT01F023	=T01F024
/*							
/*END							

\$



```
//STEP1 EXEC WATFIV.REGION=256K
//FT01F001 DD UNIT=TAPE9,VOL=SER=000123,DSN=RAWDATA1,
         DISP=(OLD,KEEP),LABEL=(1,SL,,IN)
11
//FT01F002 DD UNIT=TAPE9,VOL=SER=000123,DSN=RAWDATA2.
11
         DISP=(OLD, KEEP), LABEL=(2, SL,, IN)
//FT01F003 DD UNIT=TAPE9.VOL=SER=000123.DSN=RAWDATA3.
         DISP=(OLD, KEEP), LABEL=(3, SL,, IN)
11
//FT02FC01 DD UNIT=SYSDA,VOL=SER=WORK33,DISP=(NEW,PASS),
11
         SPACE=(CYL, (30,6)), DSN=SEMISDRT,
11
         DCB=(RECFM=VB, LRECL=3700, BLKSIZE=13000)
//SYSIN DD DATA
1/$0°T LONS
      INTEGER#2L(128)/0,1,2,3,55,45,46,47,22,5,37,11,12,13,14,15,16,17,
    >18,18,50,61,50,38,24,25,63,39,34,34,53,53,54,90,127,123,91,108,
    >80,125,77,93,92,78,107,96,75,97,240,241,242,243,244,245,246,247,
    >248,249,122,94,75,126,110,111,124,193,194,195,195,197,198,199,
    >200,201,209,210,211,212,213,214,215,216,217,226,227,228,229,230,
    >231,232,233,192,0,208,0,0,121,27*0,250,0,204,7/
      INTEGER
              IN(64), IT(64), MN(64), MX(64), UN(64), OF(64),
    > IE(11,64,28)/19712*0/,IC(5)
     INTEGER*2 SPC.SP1.SP2/0/.C(2).NM(3.64).I3(150)
      INTEGER*2 NTO(50)
     REAL 0(150)
      IPC=1
     READ (5.502) (NTO(I), I=1,50)
     IF = 1
     SPORT
     SP1=1
     READ (5,500) N
   1 PEAD (5,501,END=3) I, IN(I),IT(I),MN(I),MX(I),UN(I),OF(I),
    >(NM(J,I),J=1,3)
     DO 2 J=1.3
     CALL DEPAK(NM(J,I),C)
   2 NM(J,I)= 256*L(C(1)+1)+L(C(2)+1)
     GD TO 1
   3 DO 21 I=1.N
   4 READ (1.100, END=20) IA, (IB(J), J=2, IA)
     CALL CNVPT(ITM, IB(3), IB(4))
     IF (IB(2)-1) 15,12,5
   5 IF (IB(2)-10) 10,8,6
   6 IF (IA .LT.10) GO TO 4
     IB(5) = IB(5) + 1
     IN(IB(5)) = IB(6)
     DO 7 J=10.14
     K=Jm0
     IF (UN(IB(5)).EQ.0) UN(IB(5))=32000
   7 0(K)=FLOAT(IB(J)+0F(IB(5)))/FLOAT(UN(IB(5)))
     IF(11, IB(5), IF)=IE(11, IB(5), IF)+1
     WRITE (2,200) SP1, IB(2), IB(5), ITM, K, (O(J), J=1, K)
```

GO TO 4 8 CALL CNVPT(ITM, IB(10), IB(11)) IB(5) = IB(5) + 1DO 9 J=1,5 ID=11+3*J IC(J)=IB(ID)CALL CNVRT(IPD, IB(ID+1), IB(ID+2)) O(J) = 0. IF (IC(J),GT,0) = O(J) = FLOAT(IPD)/FLOAT(IC(J) + UN(IB(5)))9 CONTINUE WRITE (2,201) SP1, IB(2), IB(5), ITM, (IC(J), D(J), J=1,5) IE(10, IB(5), IE)=IE(10, IB(5), IE)+1 GO TO 4 10 IF (IB(2)=5)11,15,11 11 IB(5)=IB(5)+1WRITE (2,200) SP1, IB(2), IB(5), ITM IE(IB(2), IB(5), IF) = IE(IB(2), IB(5), IF)+1 GO TO 4 12 ID=5 13 IF (ID.GE.IA) GO TO 4 IB(ID)=IB(ID)+1IN(IB(ID)) = IB(ID+1)IT(IB(ID)) = IB(ID+2)MN(IB(ID)) = IB(ID+3) $M \times (IP(ID)) = IB(ID+4)$ UN(IB(ID)) = IB(ID+5)OF(IB(ID)) = IB(ID+6)DC 14 J=1.3 CALL DEPAK(IB(ID+J+6),C) 14 NM(J, IB(ID))=256*L(C(1)+1)+L(C(2)+1) J=IB(ID)ID=ID+10GO TO 13 15 DO 18 J=5, TA CALL DEPAK(IB(J),C) IF (C(1) .GE. 128 .OR.C(2).GE. 128) GD TO 4 $IB(J) = 256 \times L(C(1) + 1) + L(C(2) + 1)$ IF (C(1).NE.13) GO TO 16 $IB(J) = \uparrow$ GD TO 19 16 IF(C(2).NE.13) GO TO 17 IB(J) = L(C(1)+1) * 256GO TO 19 17 CONTINUE 18 CONTINUE 19 IF (J.GT.IA) J=IA IF (J .GT.50) J=50 JD = J - 4IF (ITM .EQ. 0) GO TO 4

\$

L6

```
IF (IB(2).EQ.0) CALL DMRTN(IB(2),NTO, IPO)
    IF (IB(2).NE.0) GD TO 197
    DB 195 M=1.64
    IE(1, M, IF) = IE(1, M, IF) + 1
    WRITE (2,204) SP1, SP2, M, SP1, IN(M), IT(M), MN(M), MX(M), UN(M), OF(M),
   >(NM(K,M),K=1,3)
195 CONTINUE
197 CONTINUE
    IF (IB(2), EQ.0) SP0=SP0+2
    SP1 = SP0 + 1
    IF (IB(2).EQ.0) TF=IF+1
    IF (IB(2) .EQ. 0) WRITE (6,601)
    WRITE (6,600) IB(2), ITM, (IB(K), K=5, J)
    WRITE (2,202) SP0, IB(2), SP2, ITM, JD, (IB(K), K=5, J)
    IE(5,1,IF) = IE(5,1,IF) + 1
    GO TO 4
 20 CONTINUE
 21 CONTINUE
    11 = SPO + 1
    M=SPC/2+1
    DO 22 J=1,64
    IE(1, J, M) = IE(1, J, M) + 1
    WRITE (2,204)I1,SP2,J,SF1,IN(J),IT(J),MN(J),MX(J),UN(J),OF(J),
   >(NM(K,J),K=1,3)
 22 CONTINUE
    WRITE (2,203) SP2, SP2, SP2, SP2, ((IE(J,K,1), J=1,11), K=1,64)
    DO 23 I=2, SP0,2
    I1 = I + 1
    M=1/2+1
    WRITE (2,2(3) I,SP2,SP2,SP2,((IF(J,K,M),J=1,11),<=1,64)
    WRITE (6,602)((IE(J,K,M),J=1,11),K=1,64)
23 CONTINUE
100 FORMAT (200(1016))
200 FORMAT (315,115,15,2(250F10,2))
201 FORMAT (315,115,7(15,F5,1))
202 FORMAT (315,115,15,100A2)
203 FORMAT (315,115, 65(1115))
204 FORMAT (315,115,6110,3A2)
500 FORMAT (15)
501 FORMAT (1018)
502 FORMAT (5011)
600 FORMAT (* TYPE: *,11,* AT *,110,5X,200A2)
601 FORMAT (///)
602 FORMAT (///,64(20X,1115,/))
    STOP
    FND
    SUBPOUTINE CNVRT (I, IH, IL)
    INTEGER#2 IH, IL
    I = IL
```

IF (1 I=I+6 RETUP END SUBR(INTEC I=J(H K=K+1 RETUF END SUBR(INTEC LOGIC EQUIN K(1)= A(4)= A(1)= J(1)= J(2)= RETUP END //\$DATA 0.050.50.000	I .LT.0) 55536*IH RN DUTINE DN GER*2 J(5 CAL*1 A(4) FN ALENCE (FAL*1 A(4) FAL*1	I=I+655 MRTN(I,J 50).I EPAK(I,J J(2), K 4) (K,A)'	36 •K) (2)			•	· ·		
3 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 9 20 1 22 23 24	1 1 1 1 1 1 1 2 2 2 2 2 2 2 2 2 2 2 2 2	10 10 10 10 10 10 10 10 10 10 10 10 10 1	-100 -100 -100 -100 -100 -100 -100 -100	2047 200047 20000000000	20000000055550000666633 22222222222222222222222222222	00000000000000000000000000000000000000	16722 16722 167226 16712 16712 16712 16712 167722 19796 19796	$\begin{array}{c} 21069\\ 21060\\ 21060\\ 21060\\ 21060\\ 21060\\ 21060\\ 21060\\ 21060\\ 21060\\ 21060\\ 11825\\ 128344\\ 118255\\ 128344$	12336 125948 13106 13366 133616 13516 13516 13516 14128 14128 19766

2567890123456789012345678901234 3333333333333344444444444444555555555	6000 6000 6000 3000 3000 3000 3000 3000	14 14 15 15 16 17 17 17 17 17 17 17 17 17 17 17 17 17	921 920 00000000000000000000000000000000	$1791 \\ 1791 \\ 2047 \\ 20047 \\ 20007 \\ 2007 \\ 2007 \\ 2007 \\ 2007 \\ 2007 \\ 2007 \\ 2007 \\ 2007 \\ 2007 \\ 200$	13 13 20 21 41 41 41 41 41 41 41 41 41 41 41 41 41	-512 -512 000000000000000000000000000000000000	19796 19796 18514 22864 8224 8224 8224 8224 8224 8224 82	12880 13136 11825 13088 16722 20291	19760 19760 19765 19760 8270 18481 19505 18482 19506 18483 19507 18484 19508 18485 19508 18485 19510 0 0 0 0
55 56 57 58 59 60 61									
62 63									ŝ
04 /*									
//STEP2 EXEC //SORTIN DD //SORTWK01 [// SPR //SORTWK02 [//SORTWK03 [//SORTWK03]	SORTD UNIT=SY DD UNIT= ACE=(CYL DD UNIT= ACE=(CYL DD UNIT= ACE=(CYL	SDA, VOL =: SY SDA, VO (30,3), SY SDA, VOI (30,3), SY SDA, VOI (30,3),	SER=WORH L=SER=WO CONTIG L=SER=WO CONTIG L=SER=WO CONTIG	<pre><33.0SN=S ORK33.DIS) ORK33.DIS) ORK33.DIS)</pre>	EMISORT P=(NEW,(P=(NEW,(P=(NEW,1	• DISP=(S DELETE)• DELETE)• DELETE)•	HR,KEEP)		

.

SPACE=(CYL, (30, 3), , CONTIG)

```
//SORTOUT DD UNIT=TAPE9, VDL=SER=000102, DISP=(NEW, PASS),
// LABEL=(1,SL).DSN=CHDATA1.F050476.L052676.LEV,
// DCB=(LRECL=3700.BLKSIZE=22000, RECFM=VB)
//SYSIN DD *
SORT FIELDS=(5,5,CH,A,15,5,CH,A,10,5,CH,A,20,15,CH,A), FILSZ=E35000
RECOPD TYPE=V.LENGTH=(3700,3700,3700,110)
END
/*
/*END
```

Appendix C

//SOFTICNS С . 60000100 С 00000200 C 20000300 C THIS FROGRAM REDUCES THE SEMIRAW DATA TO AVERAGES AT WHATEVER 00000400 C THREE INTERVALS ARE CHOSEN. AS PRESENTLY SET UP IT, WORKS ON TWO 20000500 C TAPEFILES, BUT THIS CAN BE CHANGED BY DELETION OF THE SECOND REMIND 1.00000600 С 00000700 00000800 С 00000900 С 00001000 c C VARIABLE DEFINITIONS. THESE OCCUPY A LARGE AREA' OF CORE. 320K 00001100 00001200 C ARE NEEDED TO RUN WATFIVE. INTEGER #4 [ICD(20], ICE(20), IBC(20), IEC(20), ITD(3000), IAC(20) 00001300 1 REAL=4 SCT(11.6.150)/9900*C.0/ . 2 SPD(6).D(200).COD(2000).AV(64.150).SG(64.150)00001500 з REAL #4 . >.CF(20).FCTR(20).TSP(10.150) 00001600 INTEGER#2 IB(11,64), IN(200), ITC(11,6,150)/9900+0/, ITF(20), ITTL(10,0000170) >157) 00001800 00001900 CHARACTER#20 DATE 5 DC 590 MX=1.3 0002000 6 00002100 С С 00002200 00002300 С С 00002400 C THIS TELLS HOW MANY DAYS OF DATA NEED BE TAKEN. 15. 00002500 00002500 7 READ (5,5010) MA DO 580 MB=1.MA 00002700 а 00002800 С 00002900 C 00003000 с 00003100 С 00003200 C C THEFE ARE TWO CAPDS FOR EACH DAY OF DATA. THE FIRST IS THIS: A20. 00003300 00003400 C & 20 CHARACTER HEADER PRINTED ON EACH AVERAGE. 00003500 READ (5,5020) DATE 9 00003600 C 0003700 С C THE SECOND IS A CARD CARRYING THE TIME PARAMETERS. BEGIN. INTERVAL, ENDIGEO38CG 00023900 C 311C. TIMES MUST BE SUPPLIED IN MINUTES. 0004000 .READ(5,5000) IBT. IAT. IET 10 00004100 С 00004200 С 20224300 С 60004500 4.1 IBT=IBT+6000 00004660 12 IAT=IAT+6000 00004700 13 IET=IET*6000 00004300 2 CONTINUE 14 00004900 C 00005000 С 00005100

197

	C THIS PEAD READS THE A TABLE TELLING HOW MANY OF EACH TYPE RECORD	00005200
	C ARE IN THIS DAYS CATA.	00005300
15	READ (1.1000.END=580)(IA,I=1,4).((IB(I,J),I=1.11).J=1.64)	60005400
16	CALL ITIM(IH, IX, IS, IAT)	00005500
17	IF (IX •EQ• 0) IX=60	00005500
18	I A= 0	00005300
19	DO 7 I = 1,64	00005800
20	· · · · · · · · · · · · · · · · · · ·	00005600
21	SG(1.J)=10,**30,	0006000
22	AV(I,J)=10,++30.	00006100
23	IA=IB(J,I)+IA	00006200
24	DD 5 K=1.6	00006300
25	IF (I .LT. 12) SCT(I.K.J)=0.0	, 00006400
26	IF (I \bullet LT \bullet 12) ITC(I \bullet K \bullet J)=0	00006500
27	5 CONTINUE	00006600
28	DO 7 J=12,120	00006700
29	AV(I.J)=10.***30.	00005800
30	SG(I.J)=1C.**30.	00006900
31	DO 7 K=1.6	00007000
32	IF (I .LT. 12) SCT(I,K.J)=0.0	00007100
33	IF (I +LT+.12) ITC(I+K+J)=0	`
34	7 CENTINUE	00007300
35	IF (IA .ED.0) GD TC 2	. 00007400
36	12=1A	00007500
37	IF (IAT .EQ. 0) GD TC 578	00007600
38	WRITE (6,6010)	20004400
39	IF (IB(5.1) .EQ. 0) GD TD 20	20027702
40	IA=IB(5,1)	00007800
		00007900
	c	00008000
	c	C0008100
	C NOW THE LOG IS READ IN AND IMMEDIATLY PRINTED OUT.	00005200
41	DO 19 I=1, IA	0008300
42	PEAC(1.1010) (IC, J=1, 4), IL, (IN(J), J=1, IL)	00006400
43	CALL ITIM(IH+IH+IS+IC)	00008500
44	WRITE(6. 6000) IH. IM. $(IN(J), J=1, IL)$	00336600
45	10 CONTINUE	00005700
46	20 ECNTINUE	00860000
47 '	I9(5,1)=0	* 00008900
	c The second	00009000
	c de la construcción de la constru	00009100
	c	00009200
	C THE FIRST TEN CHANNELS ARE PADAR CHANNELS AND AS A RESULT MUST B	E 00009300
	C HANDLED SEPERATLY. THIS SECTION HANDLES THEM.	00009400
48	DD 130 I=1, 10	00009500
49	READ (1,1020) (IC,IKK=1,4),INC,ITY,MIN	00009600
50	IA=IƏ(2.I)	00009700
51	T61=T781	00009800
52	.IETT=IBT+IAT	000009900
53	K=1	• 00010000
54	~DO 30 J=3,9	00010100
55	IA=IA+IB(J.I)	00010200
56	30 CENTINUE	00010300

•

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86

• .

57		CALL FURDERAL	00010400
58			00010500
59			00010600
60			00010760
61	40		00010800
62	••		00010900
63			00011000
64			00011100
65			00011200
66		FEAD(1, 1CAD) (1C, 1=1,A) (1TE(1), SPD(1), L=1, 5)	00011300
67			00011400
68			00011500
69		IF (IC-IATT) 110, 60, 60	20011600
70	60	IF (IC-IETT) 70, 100, 100	20211700
71	70	$D_{2} = A_{2} + A_{2}$	00011300
72		ITC(I, L, K) = ITC(I, L, K) + ITF(L)	00011900
73		<pre>sct(1, 1, k)=sct(1, L, k)+ITF(L)*SPD(L)</pre>	00012000
74	80	CENTINGE	00012100
75	- •	G0 T0 129	00012200
76	90		00012300
77.		CALL EMPD(L)	00012400
78		GG TO 130	00012500
79	100	IF (IETT .GE. IET) GO TC 90	00012600
80		IATT=IETT	00012700
31		IFTT=IFTT+IAT	00012800
82		K = K + 1	00012900
83		DO 105 M=1. 5	00013000
84			00013100
85		SCTLINK =0 -	00013200
86	105		00013300
87			00013400
88	110	CONTINUE	00013500
89	120	CONTINUE	00013600
9C	130	CONTINUE	60013700
	c		00013800
	¢	· · · · · · · · · · · · · · · · · · ·	00013900
	c		00014500
	C THT	S SECTION HANDLES ALL METEROLOGICAL INSTRUMENTS. THE WIND VANES	00014100
	C HAV	E THETE OWN SPECIAL CHARACTERISTICS AND ARE ROUTED DIFFERENTLY.	00014200
91		D_{0} 310 I=11. 29	00014300
92		17=0	00014400
93		SUM1=0.	00014500
94		SLMS01=0.	00014600
95		SUM=0.	00014700
96			00014800
97		TRTT_TPT	00014900
9 8		1011-10 1FTT=18T+14T	00015000
99		DEAD (1,1020) (IC.IKK=1.4).INC.ITY.MIN	00015100
5.5			
100		NM3R=IAT/INC	60715207
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101		IA=IE(2.1)+IB(3.1)+IB(4.1)+IB(5.1)	00015300
102		CALL DMPD(IA)	00015400
103		IF (IB(6.I) .EQ. 0) GD TO 160	00015500
104		IA=18(6.I)	00015600
105		K = 1	00015700
106		ICD(1)=0	00015800
107		-D0 150 J=1, IA	00015900
108		READ(1. 1630) (IC. L=1. 4)	00015000
109		"IF (ICD(K), •GE• 1C) GO TO 140	00016100
110		ICD(K)=IC	00016200
111	140	CENTINUE	00016300
112	150	CENTINUE	00016400
113	160	CENTINUE	00016500
114		ICE(1)=100000000	00016900
115		IF (IB (7+I) +EC+ 0) GO TO 200	00016500
116		IA=I8(7.I)	00016700
117		K=K-1	00015500
118		L=1 (00017000
119		DO 190 J=1, IA	00017100
120		READ(1, 1030) (IC, M=1, 4)	00017200
121		IF (IC +LE+ ICD(L)) GU TO 190 /	00017300
122		ICE(L)=IC	00017400
123		L=L+1	00017500
124		IF (ICD(L) \bullet LT \bullet ICE(L-1)) L=L+1	00017800
125		IF (L .LE. K) GO TO 190	00017700
126		L=IA-J	00017800
127		CALL DMRD(L)	00217900
125		GO TO 200	00018000
129	190		00013100
130	20.0		C00182C0
133			00018300
132			00018400
133			00018500
134			00018600
135			0018700
137			00019900
179			00018900
130			00019909
1 3 7			00019100
141			00019200
142	235		00019300
143	205		00019400
144	210		00019500
125	210		00019300
146		1F (M.GT. 18(5.1)) GO TO 215	00019800
1 4 7		TE (ITD(F) ATTA TOE(N) ANDA ITD(F) AGTA TOD(NIN OD TO 250	00019800
149		TE (ITO(1) _ GT_ (CE(M)) M=M+1	00019900
1 4 Q		$IF (M + T_2) GO TO 215$	00020100
60		$TE (ICC(M) + T_{1} + TCE(M+1)) = M=N+1$	200202000
		- キャー・キャック・ション・ション・ション・ション・ション・ション・ション・ション・ション・ション	ションションション

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151	21	5 CONTINUE	00020200
152			00020309
153		IF (L .LE. IL) GO TO 205	00020400
154		L=1	00021500
155	220	CENTINUE	00020500
156		IF (ITD(L) +LT+ IBTT) GO TO 230	00020700
157		IF (ITD(L) .GE. IETT) GO TO 250	00023800
158		I Z = I Z + 1	00020900
159		IF (IC .50. 13) 60 TO 240	00021000
160		564=504+D(L) /	00021100
151		SUMSQ=SUMSQ+D(L)*+2	00021200
162	230	CENTINUE	00021300
1 5 3		L=L+1	00021400
164		IF (L .GT. IL) GO TO 280	00021500
155		GD T3 220	00021500
	c		0021700
	c		00021800
	с		00021900
	C HES	15 IS THE WIND VANE HANDLING SECTION.	00022000
156	240	CENTINUE	00722100
157		$DD_1 = D(1) \pm 3 + 1415 C26/180$	00022200
168			00022300
169			00022400
170			00022500
171			00022500
172			00022700
173			00022900
174			01022300
175	250		60023000
176	200		00053100
177			00023200
178			00023300
179		56(1, K) #50R1 ((SUMSO=(SUM/SUM/IZ))/(IZ=1))	0023400
180		IF (ID +NE+ I3) GD TO 260	00023500
181		TE (10/1 + K)=(180/3 + 1415926) * 4T AN2(AV(1+K), SUM1/1Z)	00023600
182		IF (AV(I,K) +LT= 0.) AV(I,K)=AV(I,K)+360.	00023700
193	260	SQ(1+K)=SQ+T((SG(1+K)++2)+((SUMSQ1-(SUM1*+2/IZ))/(IZ-1)))+57+14	00023800
184	200		00023900
105		1 12 • 6: • 3= N/SH/4) GU 10 270	00124000
100		AV[1,K]=[0,#=30,	00924100
100		36(1+K)=10+ ##30+	00024200
10/	270	CONTINUE	00024300
100			20024400
189			00024500
196			10024600
191		IF (1517 .GT. IET) GO TO 290	00024700
192		SUM= 0 .	00024300
193		5UM1=0• ·	00024900
194		SUNSQ=0.	00025000
195		SUMSQ1=0.	00025100
		I Z=0	00025200
		GO TO 220 ·	00025300

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198	280	CENTINUE ,	00025400
199		AI=L	10025500
200	290	CONTINUE	00025600
201		L=IA-J	00025700
202		CALL DWRD(L)	20025800
203	31 0		00025900
	c		00026000
	c		00026100
	с		00026200
	C THE	ECOLYZERS ALSO REQUIRE A DIFFERENT APPROACH. THEY ARE HANDLED	IN 00026300
	C SEC	TIGN. THEY ARE THE ONLY INSTRUMENTS WHICH HAVE A CALIBRATION F	ACTC00026400
	C INI	FROEUCED. THE METEROLOGICAL INSTRUMENTS DO NOT REQUIRE SUCH TRE	ATME00326500
204		CC 540. I=30, 41	00026600
205		READ (1.1020) (IC.IKK=1.4).INC.ITY.MIN	00026700
206		NCAL = 0	00026600
207		ITF(1)=100000000	00026000
208		IBC(1)=100000000	00027000
209		IEC(1)=100C000000	00027100
210		FCTR(1)=0.0	00027200
211		IF (IB(2,I) .EQ. 0) GO TO 350	00027300
212	`	IA=I3(2,I)	00027400
213		K=1 ·	20227500
214		IBC(1)=0	00027500
215		DC 320 J=1, IA	00027760
216		READ (1, 1030) (IC, L=1, 4)	00027800
217		IF (IC +LE+ IBC(K)) GO, TC 320	00027900
218		IBC(K-)=IC	00028000
219		1 BC(K+1)=1C	00028100
220		IEC(K)=IC+60000	00025200
221		ITF(K)=IC	00028300
222		FCTR(K)=0.	00028400
223		K = K + 1	00028500
224		ITF(K)=IC	00329500
225		FCT9(K)=9.	00028700
226	320	CENTINUE	00028900
227		NCAL=K-1	00028900
228		IF (NCAL . GT. 18(2.1)) NCAL=18(2.1)	00020300
229		18(2.1)=0	00029100
230		IF (IE(3.1) .FQ. 0) GG TC 350	00029200
231		IA=18(3,1)	00029200
232		IF (NCAL . EQ. 5) GO TO 350	00329400
233		DO 340 J=1 . IA	00029400
234		READ(1, 1030) (IC, L=1, 4)	00729700
235		FCTR(J+1)=0.	00029800
236		DO 330 L=1 . NCAL	00029900
237		IF (IC .GT. IBC(L) .AND. IC .LT. IEC(L)) IEC(L)=10	00030000

238		IF (IC .GT. IBC(L)) GO TC 340	00030100
239	330	CONTINUE	00030200
240	340	CENTINUE	00030300
241		IB(3. I)=0	00030400
242	350	CENTINUE	00030500
243		K=1	00029500
244		IA=IB(2,I)+IB(3,I)+IB(4,I)+IB(5,I)	00030500
245		CALL CMPD(IA)	. (2030700
246		IF (IE(6.I) .EG. 0) GO TO 420	22032802
247		IA=IB(6.I)	000 30 900
248		ICD(1)=0	00031000
249		DO 380 J=1, IA	. 00031100
250		READ(1, 1030) (IC, L=1, 4)	0031200
251		IF (1CD(K).GE. IC) GO TO 380	00031300
252		ICD(K)=IC	20231400
253		ICD(K+1)=IC	> 00031500
254		K=K+1	00031600
255	380	CENTINUE	00031700
256		NCD=K-1	01031800
257		ICE(1)=8640000	00051050
258		L=1	00032600
259		IA=18(7.1)	00032000
260			00032103
261			00032200
262		PFAP(1, 1030) (10, K-1, A)	00032303
253		IE (L GT. NCD) GO TO A10	00032400
264			00032500
265			
266			00032700
267		10 (10 sets 100(m)) 30 10 400	00032300
201			90935900
200			00733000
209		IF (M GES NO) GE IE 410	00033100
270			00033200
271			. 00033300
272		GO TO 410	00033400
273	400	CONTINUE	00033500
274	410	CENTINJE	00033600
275		12(7,1)=9	20033700
276	420	CONTINUE	00033900
277		IA=IE(7, I)+ IB(8,I)+ IB(9,I)+ IB(10, I)	00033900
278		CALL_CMRD(IA) ~	. 00034000
279		K = 1	00034100
280		1 TD (1)=0	C0034200
281		M=[C 0 0 3 4 3 0 0
292		IF (18(11. I) .EQ. 0) GO TO 540	00034400
283		IA=18(11, I)	00034500
284		N=1	00034600
235	a	DO 460 J=1. 14	000 34700

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230		READ(1, 1050) (IC, L=1, A), IL, $(C(L), L=1, IL)$	0034800
287		IF (IC .LT. ITD(K)) GG TO 460	00034900
288		ITO(K)=IC	00035000
289		ID=K+IL	00035100
290		COD(K)=D(1)	20035200
291		ITD(K+1)=ITD(K)	00035300
292		K=K+1	00035400
293		DO 450 L=2, IL	00035500
294		COD(K)=C(L)	00035600
295	430	CCNTINUE	00035700
296		ITD(R)=ITD(K)+INC	00035800
297		IF (ITD(K) .GT. 8640000) GD TC 435	
298		IF $(M \in G T \cup I \ni (6, I))$ GO TC 435	00035900
299		IF $(ITD(K) \bullet GT \bullet ICE(M)) M=M+1$	0036000
300		IF (ITD(K) .GT. ICD(M)) GO TO 430	00036100
301	43	5 CENTINUE	00036200
352			00036300
303		IF (ITE(K) .GT. IBC(N) .AND. D(L) .GT. FCTR(N)) FCTR(N)=D(L)	00036400
374		IF (ITD(K) •GT• IBC(N) •AND• D(L) •GT• FCTR(N)) ITF(N)=ITD(K)	00036500
305		IF(ITU(K) + GT - IBC(N)) COD(K) = -10000	00036600
306		IF (N .GT. NCAL) GC TC 440	
307		IF $(I \top D(K) \bullet G \top \bullet I E G(N)) N = N + I$	00026700
308		IF (N .LE. NCAL) GO TO 440	00036900
309		IBC(N)=100000000	00036900
310		1EC(N)=100000000	00037000
211		FCTP(N)=0.	00037100
312	440	CONTINUE	00037200
313		K=K+1	20037300
314	450	CONTINUE	000 37400
315		K=<-1	00037500
316	460	CENTINUE	00037600
317		SUM=0.	00037700
318		SUNSQ=0.	00037800
319		NCATEK-I	000,37900
320		NBR=IAT/INC	00038000
321			00038100
322		IAC(T)=ITD(I)	C0038200
323		NCAL=NCAL+I	00038300
324		IF (NCAL +LT-2) GO TO 500	00038400
325		FCTR(NCAL)=FCTR(NCAL-I)	00038500
326		DC 490 J=2, NCAL	00038500
321		IAC(J)=11+[J-1]	00038700
328			0088600
329		1 F (CF(J) +LT, +7) CF(J)=CF(J-1)	C0033970
330	490	CENTINUE	00039000
331	500	CONTINUE	00039100
332		CF(NCAL+1)=CF(NCAL)	00039200
333		IAC(NCAL+2)=100000000	00039300
1 3 3 4		IAC{NCAL+1}=1000000000	

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335 NCNT=0 C00396 336 K=1 000397 337 L=1 000396 338 IETTEIST 000396 340 D0 510 J=1, NDAT 000396 341 IF (ITO(J) + LT. IBTT) GD TD 520 000401 342 IF (ITO(J) + LT. + IBTT) GD TD 520 000401 343 SIC CONTINUE C00200 000441 344 IF (COD(J) + LT+50+) GC TD 520 000401 344 IF (COD(J) + LT+50+) GC TD 520 000401 345 CODE-COLJ) 000140 000240 345 CODE-COLJ) 000401 000401 345 CODE-COLJ) 000401 000401 346 IF (IAC(L+1)-IAC(L))/FLOAT(IAC(L+1)-IAC(L)))*CF(L) 000402 350 SLMSOS-SUMSG-CODD*2 000411 000403 351 NCNTENCNT+1 000413 000413 352 IF (ITO(J) + GT - IECT) GD TO 540 000413 353 IF (ITO(J) + GT - IECT) GD TO 540 000413 356 AXVI + KI = IO.**30+				
336 K=1 007392 337 L=1 000357 338 IETTEIBTIAT 000353 339 TETTEIBTIAT 000353 341 IF (1101) + LT. 13TT) GO TO 530 000403 342 IF (1101) + LT. 13TT) GO TO 530 000403 343 S10 CCMITNUE 00053 344 IF (c001) + LT.=50.) GC TO 530 000426 343 S10 CCMITNUE 0005426 344 IF (c001) + LT.=50.) GC TO 530 000426 345 CODD=CCD(J) - (TL=50.) AC(L) //ELOAT(1AC(L+1)-IAC(L)))*CF(L+1)003407 000426 346 IF (IAC(L+1)-IO(J))/FLOAT(IAC(L+1)-IAC(L)))*CF(L+1)003407 000426 347 CODE-CODU) - (TLEAT(IAC(L+1))-IAC(L))/FLOAT(IAC(L+1)-IAC(L)))*CF(L+1)003407 000426 358 SUMSO-SUMSO, CCDD*2 000412 000412 359 SUMSO-SUMSO, CCDD*2 000413 000413 351 IF (ITD(J)).GT. IAC(L+1)) L=L+1 000426 000414 354 GO TO 530 GO TO 540 000414 355 E20 C	335		NCNT=0	00039500
337 L=1 000359 338 IETTEIBT.IAT 000359 340 D0 S30 J=1, NDAT 000401 341 IF (ITOJ) IBTT) GO TO 530 000401 342 IF (ITOJ) IFT) GC TO 520 000401 343 SIO CONTINUE C000401 344 IF (CODIJ) IFT) GC TO 520 000401 345 CODDCODIJ-: COD2001 346 IF (LACL+1) SOLIACLI) GO TO 515 000402 347 CODDCODIJ-: IITOLOJI/JELOAT(IACLL)/FLOAT(IACLL+1)-IACLI))*CF(IL+1)002407 348 SIG CONTINUE 000401 349 SUM=SUM+CODD 000401 350 SUMSO-SUMSG.CODD*2 000411 351 NCMT=KCMT+1 003412 352 IF (ITOLJ) .GT. IACL(+1)) L=L+1 000413 353 IF (NCNT).GT. (IET) GO TO 540 000414 354 GO TO 530 000414 355 S20 CANTINUE 000415 356 AV(I.K)=IO.*30. 000416 357 SG [I.K)=IO.*30. 000416 358 IF (NCNT .GT. (3NNBR/A J)) SG(I.K)=SORT((SUMSO-(SUM*2/NCNT))	336		K=1	00039600
338 IETTEISTIAT 000355 336 DD 530 J=1, NDAT 000353 336 IF (ITOLJ)+LT. IBTJ GO TO 530 000400 341 IF (ITOLJ)+LT. IBTJ GO TO 530 000400 343 S10 CCNTINUE 000400 343 S10 CCNTINUE 000400 344 IF (CDCJ)+LT.=50.1 GC TO 530 000400 345 CODD=CCD(J)+(FLCAT(ITO(J))-IAC(L))/FLOAT(IAC(L+I)-IAC(L)))*CF(L)) 000400 346 IF (ITACL+1)+S0.1AC(L))-IAC(L))/FLOAT(IAC(L+I)-IAC(L)))*CF(L)) 000400 348 S15 CCNTINUE 000400 000400 349 SUMSSUM-CODD 000410 000410 350 SUMSSUM-CODD+2 000411 000412 351 IF (ITO(J)-GT. IAC(L+1)) L=L+1 000412 000412 352 IF (ITO(J)-GT. IAC(L+1)) L=L+1 000413 000413 354 GO TO 530 GO 3414 000414 355 520 CMTINUE GO 3414 355 S20 CMTINUE 000413 356 A	337		_L = 1	00039700
330	338		IETT=IT	00039500
340 D0 530 J=1, NDAT 000400 341 IF (ITO(J) +LT. ISTT) G0 TO 530 000400 343 S10 CCNTINUE C00403 344 IF (CO(J) +LT50.) GC TO 530 000402 345 CODDE-CCD(J) - C00403 346 IF (IA:(L+1)-E0.IA:(L)) GO TO 515 000404 347 CODDE-CD(J) + ((FLCAT(ITO(J)-IAC(L)))/FLOAT(IAC(L+1)-IAC(L)))*CF(L+1)002467 >>>>>>>>>>>>>>>>>>>>>>>>>>>>	339		~IETT=IAT+IAT	00039960
1 IF (TTOLJ) *LT. IBTT) GO TO 530 000401 342 IF (ITOLJ) *GT. IETT) GC TO 520 000402 344 IF (CODLJ) *LT.*50.) GC TO 530 000402 344 IF (CODLJ) *LT.*50.) GC TO 530 000402 345 CODDECCLJ). 000402 346 IF (CODLJ) *LT.*50.) GC TO 530 000402 347 CODDECCLJ). 000402 348 515 CCMTINUE 000403 349 SUMSOUSCOULT 000401 351 NCMTENCNT*I 000411 352 IF (ITOLJ).GT. IAC(L+1)/LELAT (IAC(L+1)-IAC(L)))*CF(L) 000413 353 SUMSOUSCOUP*2 000414 354 GO TO 530 000415 355 S20 CONTINUE 000415 356 AV(I.*L=10.**30. 000415 357 SG(I.*K)=10.**30. 000415 358 IF (NCNT.GT. (3*NMBR/A) AV(I.*K)=SUM/NCNT 000413 359 IF (NCNT.GT. (3*NMBR/A) AV(I.*K)=SUM/NCNT 000422 351 IBTT=IETT 000423 000423 <tr< td=""><td>340</td><td></td><td>DD 530 J=1. NDAT</td><td>00046000</td></tr<>	340		DD 530 J=1. NDAT	00046000
343 510 CCNTINUE CC0403 344 1F (CD01) *LT*=50*) GC TO 530 CC0403 345 CDDE=CCD(J) *LT*=50*) GC TO 530 CC0403 346 1F (LAC(L+1)*=C0.LAC(L)) GO TO 515 CC0403 347 CDDE=COD(J)*((FLCAT(ITO(J))*LAC(L))/FLCAT(IAC(L+1)*IAC(L)))*CF(L+1)00467 >***********************************	341		IF (ITD(J) .LT. IBTT) GO TO 530	00040100
314 IF (CD(J) +LT=50+) GC TO 530 CO0402 314 IF (CD(J) +LT=50+) GC TO 530 O02402 326 IF (TAC(L+1)+E0+TAC(L)) GO TO 515 O02402 327 CODECCD(J) - O02402 328 515 CONTINUE CODECCD(J) - 328 515 CONTINUE COD402 329 SUMESU4+CODD O02402 320 SUMESU4+CODD 002411 351 NCNTANCNT+1 CO0422 352 IF (TD(J))-GT. 1CT)/FLOAT(IAC(L+1)-IAC(L)))*CF(L+1) CO0423 353 SUMESU4+CODD 002412 354 GO TO 530 000416 355 S20 CONTINUE 000416 355 S20 CONTINUE 000416 355 S20 CONTINUE 000416 356 AV(I+K)=10.**30. 000416 000416 357 SG(I-K)=10.**30. 000416 000416 358 IF (NONT -GT (3*NMBR/4))AV(I-K)=SUM/NONT CO0418 000422 359 IF (NONT -GT (3*NMBR/4))AU(I-K)=SUM/NONT CO0424 000422 350 KCNT -I) 300421 <td>342</td> <td></td> <td>IF (ITD(J) .GT. LETT) GC TC 520</td> <td>00040200</td>	342		IF (ITD(J) .GT. LETT) GC TC 520	00040200
345 IF (COD(J) + Li = -50+) GC TO 530 002426 345 CODDECCD(J) - (CDDECCD(J) - (CLD)) + (CECT(L)) GO TO 515 002426 347 CODDECCD(J) + ((FLCAT(ITD(J) - IAC(L))) + FLOAT(IAC(L+1) - IAC(L))) + (FL(L+1)) 002407 009426 348 515 CCNTINUE 0004426 0004426 349 SUM=SUN4CODD 000412 000441 350 SUMS0+CCDD+*2 000413 351 NCNT=NCHT+1 0004426 352 IF (ITD(J) - GT- IAC(L+1)) L=L+1 000414 354 GO TO 530 000414 355 520 CCNTINUE 000416 356 AV(I,*)=IO.*30. 000416 357 SG(I,K)=IO.*30. 000416 358 IF (NCNT -GT. (3*NMBB/4)) AV(I,K)=SUM/NCNT 000418 359 IF (NCNT -GT. (3*NMBB/4)) SG(I,K)=SORT((SUMSG-(SUM*2/NCNT)))'''''''''''''''''''''''''''''''''	343	51 0	CONTINUE	C 0 0 4 C 3 0 0
345 CDDD-CCD(J)	344		IF (COD(J) %LT.+50.) GC TO 530	00040400
346 IF (IAC(L+1)*E0.IAC(L)) GO TO 515 000405 347 CDDE=CDD(J)*((FLCAT(ITD(J))-FLCAT(IAC(L+1)-IAC(L)))*CF(L)) 009406 348 515 CCNTINUE CD30407 349 SUMSD=SUMSCHCDDD 000410 350 SUMSD=SUMSCHCDDD 000413 351 NCNT=NCNT+1 000413 352 IF (ITD(J)*GT*IET) GD TO 540 000413 353 IF (ITD(J)*GT*IET) GD TO 540 000413 354 GD TO 530 CO00415 355 520 CCNTINUE 000413 356 AV(I*C)=CCNTINUE 000413 357 SG(I*N=0.**30.* 000415 358 IF (INCNT *GT*(ISNMBR/4))AV(I*K)=SUM/NCNT 000413 359 IF (NCNT *GT*(ISNMBR/4))AV(I*K)=SUM/NCNT 000414 351 IBTT=IETT 000422 351 IBTT=IETT 000423 364 SUM=0.* 000424 355 SUMSG=0.* 000424 364 SUM=0.* 000423 365 SUMSG=0.* 000423 366 GO TO 510 000423 367 SO C	345			00040500
347 CODDECOD(J)*((FLCAT(ITD(J)-IAC(L))/FLCAT(IAC(L+1)-IAC(L)))*(F(L+1)009407 >+(FLGAT(IAC(L+1)-ITD(J))/FLCAT(IAC(L+1)-IAC(L)))*(F(L)) 009408 348 S15 CCMTINUE C09409 350 SUMASGEQCOD*2 900411 351 NCMT=NCMT+1 009412 352 IF (ITD(J):GT. IAC(L+1)) L=L+1 009413 353 IF (ITD(J):GT. IET) GD TO 540 009414 354 GO TO 530 C09415 355 520 CCNTNUE 009415 356 AV(I:K)=I0.**30. C09415 357 SG(I:K)=I0.**30. C09415 358 IF (NCNT.GT. (3*NMBR/4)) AV(I.K)=SUM/NCNT C09417 359 IF (NCNT.GT. (3*NMBR/4)) SG(I.K)=SORT((SUMSG-(SUM*2/NCNT)))?0420 209421 360 K=K+1 000422 361 IBTT=IETT 000423 362 IET(INCT.I.T 000423 363 NCMT=0 000423 364 SUMSO=0. 000423 365 SUMSO=0. 000423 366 SuMSO=0. 000423 </td <td>346</td> <td></td> <td>IF (IAC(L+1).EQ.IAC(L)) GO TO 515</td> <td>00040603</td>	346		IF (IAC(L+1).EQ.IAC(L)) GO TO 515	00040603
>+(FL DAT (I AC(L + 1) - ITD(J))/FL DAT (I AC(L + 1) - IAC(L)))*CF(L)) 00940E 348 515 CONTINUE C03409 350 SUMS0-SUMSG.CODD*2 009411 351 NCNT=NCNT+1 009412 352 IF (ITD(J).GT. IAC(L+1)) L=L+1 009412 353 IF (ITD(J).GT. IAC(L+1)) L=L+1 009414 354 GO TO 530 009415 355 520 CCNTINUE 009416 356 AV(I.K)=IC.**30. 009416 357 SG(I.K)=IC.**30. 009416 358 IF (NCNT.GT.(3*NMBR/A))AV(I.K)=SUM/NCNT C09418 359 IF (NCNT.GT.(3*NMBR/A))AV(I.K)=SUM/NCNT C09419 350 K=K+1 009424 009422 351 IBTT=IETT 009428 009428 353 NCNT=0 000423 000423 354 SUMS0=0. 000423 000423 355 SUMS0=0. 000423 000423 356 SUMS0=0. 000423 000423 357 SIC<	347		CODE=COD(J) * ((ELDAT(ITD(J) - IAC(L))/ELDAT(IAC(L+1) - IAC(L))) * CE	(L+1)00040700
348 515 CONTINUE C03409 349 SUM=SUM=COD 000410 350 SUMS0=SUMSQ+CCD0+2 000411 351 NCNT=NCNT+1 003412 352 IF (ITD(J) * dT. IAC(L+1)) L=L+1 000414 353 JF (ITD(J) * dT. IAC(L+1)) L=L+1 000414 354 G0 TO 530 000415 355 S20 CCNTINUE 000416 356 AV(I.<)=I0.**30.	-		>+(FL DAT (I AC () +1)-ITD(J))/FL DAT (IAC (L+1)-IAC (L)))*CF(L))	00040800
349 SUM=SUM=SCODD 900413 350 SUMSG=SUMSG+CCDD*2 300411 351 NCNT=NCNT+1 303411 352 IF (ITD(J) •GT. IAC(L+1)) L=L+1 000413 353 IF (ITD(J) •GT. IET) GO TO 540 000414 354 GO TO 530 000416 355 520 CCNTINUE 000416 356 AV(I.K)=IO.**30. 000416 357 SG(I.K)=IO.**30. 000416 358 IF (NCNT •GT. (3*NMBR/A))AV(I.K)=SUM/NCNT 000416 359 IF (NCNT •GT. (3*NMBR/A))AV(I.K)=SUM/NCNT 000423 350 K=K+1 300421 300421 360 K=K+1 300423 300425 361 IBTT=IETT 030425 30425 362 IETT=IETT+IAT 030425 30425 363 NCNT=0 302425 30425 364 SUM=0. 000423 30425 365 S40 CNTINUE 002429 368 540 CN	348	515	CONTINUE	00040900
350 SUMSQ-SUMSQ+CCDD**2 309411 351 NCNT=NCNT+1 003412 352 IF (ITO(J) GT. IAC(L+1)) L=L+1 000413 353 IF (ITO(J) GT. IET) GD TD 540 000414 354 GD TD 530 000416 355 520 CCNTINUE 000416 356 AV(I,K)=I0.**30. 000416 357 SG(I,K)=I0.**30. 000416 358 IF (NCNT.GT. (3*NMBR/A))AV(I,K)=SUM/NCNT C00417 359 IF (NCNT.GT. (3*NMBR/A)))SG(I,K)=SORT((SUM*2/NCNT))D*0420 000422 351 IBTT=ETT 000422 352 IET (NCNT-GT. (3*NMBR/A)))SG(I,K)=SORT((SUMSG-(SUM*2/NCNT))D*0420 000422 351 IBTT=ETT 000422 352 IETT=ETT 000422 353 NCNT=0 000423 354 SUM=0. 000423 355 SUMSQ=0. 000422 356 GC TO 510 000423 357 S30 CCNTINUE 000433 356 GC CONTINUE 000433 357 IDAGE1 000433 359 <td< td=""><td>349</td><td></td><td>SUMESUMECODD</td><td>20241202</td></td<>	349		SUMESUMECODD	20241202
351 NKNT=RCNT+1 000412 352 IF (ITD(J) .GT. IAC(L+1)) L=L+1 000413 353 IF (ITD(J) .GT. IET) GO TO 540 000414 254 GO TO 530 000415 355 520 CCNTINUE 000413 356 AV(I:K)=10.**30. 000414 357 SG(I:K)=10.**30. 000413 358 IF (NCNT.GT.(3*NMBR/A))AV(I.K)=SUM/NCNT (00419 259 IF (NCNT.GT.(3*NMBR/A))SG(I.K)=SORT((SUMSG-(SUM**2/NCNT))?^0420 351 IBTT=IETT 000422 351 IBTT=IETT 000423 353 SUMSO=0. 000423 354 SUMSO=0. 000423 355 SUMSO=0. 000423 356 SUMSO=0. 000423 357 S30 CCNTINUE 000423 358 ISTT=IETT 000423 356 SUMSO=0. 000423 357 S30 CCNTINUE 000423 358 ISTT=IETT 000423 359 IBTT=IETT 000423 366 S40 CCNTINUE 000423 370 <t< td=""><td>350</td><td></td><td>5UN50=SUN50+CCDD##2</td><td>00041100</td></t<>	350		5UN50=SUN50+CCDD##2	00041100
352 IF (ITD(J) *GT* IAC(L+1)) L=L+1 900413 353 IF (ITD(J) *GT* IET) GQ TO 540 000414 354 GQ TO 530 000415 355 520 CCNTINUE 000413 356 AV(1*K)=IG**30* 000414 357 SG(1:K)=IO.**30* 000418 358 IF (NCNT*GT*(3*NMBR/4)) AV(1;K)=SUM/NCNT 000418 359 IF (NCNT*GT*(3*NMBR/4)) SG(1:K)=SQRT((SUMSQ-(SUMSQ-(SUMS2/NCNT)))^00423 360 K=K*1 000423 360 K=K*1 000423 361 IBTT=IETT 000423 362 IETTIFITITITIAT 000423 363 NCNT=0 000423 364 SUMSQ=0 000423 365 SUMSQ=0 000423 366 GC TO 510 000423 370 NAVG=(IET-IBT)/AIAT 000433 371 IPAG=1 000433 C 000433 000433 C 000433 000433 C 000433 000433 GC 000433 000433 C 000433 <	351			00041200
353 IF (ITDLJ) • GT. IET) GO TO 540 000414 354 GO TO 530 000415 355 520 CGNTINUE 000415 356 AVI.* I.* 000415 357 SG(I.* I.* 000415 358 IF (NCNT.GT. (3*NMBR/4)) AV(I.* 000415 359 IF (NCNT.GT. (3*NMBR/4)) SG(I.* 000412 350 IF (NCNT.GT. (3*NMBR/4)) SG(I.* 000422 351 IBTT=IETT 000423 352 IETIT=IETT*IAT 000423 353 NCNT=0 000423 354 GO TO 510 000423 355 SUMS0=0. 000423 356 SAO CCNTINUE 000423 357 SGO CONTINUE 000423 356 SAO CCNTINUE 000423 357 SAO CCNTINUE 000423 358 IBTT=FBT-IAT 000423 359 IBTT=FBT-IAT 000423 370 NAVG=(IET-IBT)/IAT 000423 371 IPAG=1 000423 C 000423 000423 C </td <td>352</td> <td></td> <td>IF (ITO(J) aGT (AC(L+1)) L=L+1</td> <td>. 00041300</td>	352		IF (ITO(J) aGT (AC(L+1)) L=L+1	. 00041300
354 G0 TO 530 G00415 355 520 CCNTINUE 000416 356 AV(I.K)=10.**30. 000416 357 SG(I.K)=10.**30. 000418 358 IF (NCNT.GT.(3*NBR/4))AV(I.K)=SUM/NCNT 000418 359 IF (NCNT.GT.(3*NBR/4))SG(I.K)=SUM/NCNT C00419 360 K=K+1 000422 361 IBTT=IETT 000423 362 IETT=IETT+IAT 000422 363 NCNT=0 000422 364 SUM=0. 000422 365 SUMSQ=0. 000422 366 GO TO 510 000422 367 S30 CONTINUE 000422 368 S40 CONTINUE 000422 369 IBTT=FBT-IAT 000422 000422 371 IPAG=1 000423 000423 C 000423 000425 000425 C 000424 000425 000425 C 000425 000425 000425	353		IF (ITD(4) + GT+ IFT) GO TO 540	00041400
355 520 CCNTINUE 000416 356 AV(I,K)=10.**30. C00417 357 SG(I,K)=10.**30. 000418 358 IF (NCNT.GT.(3*NMBP/4))AV(I,K)=SUM/NCNT C00419 359 IF (NCNT.GT.(3*NMBP/4)))SG(I,K)=SORT((SUMSG-(SUM*2/NCNT))?00420 1/(NCNT-1)) 360 K=K+1 000422 361 IBTT=IETT 000423 362 IETT=IETT+IAT 000423 363 NCNT=0 000423 364 SUM=0. 000422 365 SUMSG=0. 000423 366 GC TO 510 000423 367 S30 CONTINUE 000423 368 S40 CONTINUE 000423 371 IPAG=1 000433 000433 C 000433 000433	754			00041500
356 AV(I,K)=10.**30. C00417 357 SG(I,K)=10.**30. 000418 358 IF (NCNT .GT. (3*NMBR/4))AV(I,K)=SUM/NCNT (00419 000421 359 IF (NCNT .GT. (3*NMBR/4)) SG(I,K)=SORT((SUMSG-(SUM**2/NCNT))70420 000422 360 K=K+1 000422 361 IBTT=IETT 000424 362 IETT=IETT+IAT 000422 363 NCNT=0 000422 364 SUMSQ=0. 000422 365 SUMSQ=0. 000422 366 GC TO £10 000422 367 S30 CCNTINUE 000422 368 IBTT=FBT-IAT 000422 369 IBTT=FBT-IAT 000422 370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000433 C 000433 000433 C 000434 000433 C 000435 000433 C 000435 000433 C 000435 000433 C 000435 000433 C 000436 000433	766	520		00041600
357 SG(1+K)=10.++30. 000418 358 IF (NCNT.GT. (3*NMBR/4))AV(1.K)=SUM/NCNT (00419 359 IF (NCNT.GT. (3*NMBR/4))SG(1,K)=SUM/NCNT (00421 350 1/(NCNT-1) 350 X=X 351 IBTT=IETT 352 IETT=IETT 353 00421 354 NCNT=0 355 364 356 GC TO \$10 357 S30 CCNTINUE 356 S40 CCNTINUE 357 NAVGE(IET-IBT)/IAT 357 O00423 357 C 358 C 359 IBTEFERTINT 356 GC TO \$10 357 S30 CCNTINUE 358 S40 CCNTINUE 359 IBTEFERTIAT 350 CATINUE 351 IPAG=1 352 C 353 C 354 C 355 S40 CONTINUE 356 IBTEFERTIAT 357 IDAG=1 359 IDAGE1 <	333	32.4		C0041700
358 IF (NCNT • GT • (3*NMBR/4)) AV(I • K) = SUM/NCNT (00419 359 IF (NCNT • GT • (3*NMBR/4)) SG(I • K) = SQRT((SUMSG - (SUM**2/NCNT))?0420 00421 360 K = K • I 000422 361 IBTT = IETT 000422 362 IETT = IETT + IAT 000422 363 NCNT=0 002422 364 SUMS0=0. 002425 365 SUMS0=0. 002426 366 GC TO 510 002422 368 S40 CNTINUE 000422 369 IBTT=IBT-IAT 000423 370 NAVG=(IET - IBT)/IAT 000423 371 IPAG=1 000433 C 000433 000433 C 000435 000433	350		SG(1,K)=10.++30.	00041800
255 IF (NCNT •GT • (3*NMBR/4)) SG(1.K)=SQRT((SUMSQ-(SUM**2/NCNT))?^0420 260 K=K+1 000422 361 IBTT=IETT 000424 362 IETT=IETT+IAT 000424 363 NCNT=0 000425 364 SUMSQ=0. 000426 365 GO TO £10 000426 366 GO TO £10 000426 367 S30 CCNTINUE 000426 368 S40 CCNTINUE 000426 370 NAVG=(IET-IBT)/IAT 000423 000423 371 IPAG=1 000423 000423 C 000426 000426 000426 GC 000426 000426 000426 371 IPAG=1 000433 000433 C 000433 000433 000433 000433 C 000436 000433 000433 000433 000433 000433 C 000437 000436 000433 000433 000433 000433 000433 000433 000433 000433 000433 000433	358		IF (NCNT .GT. (3*NMBR/4))AV(I.K)=SUM/NCNT	(0041900
1/(NCNT-1)) 309421 260 K=K+1 000422 361 1BTT=IETT 000423 362 IETT=IETT+IAT 000423 363 NCNT=0 000423 364 SUMSQ=0. 000423 365 SUMSQ=0. 000423 366 GC TO £10 000423 367 530 CCNTINUE 000423 368 540 CCNTINUE 000423 369 IBTT=FBT-IAT 000433 000433 370 NAVG=(IET-IBT)/AIAT 000433 000433 C 000433 000434 000434 C 000434 0004434 0004434 C <td>359</td> <td></td> <td>IF (NCNT .GT. (3*NMBR/4)) SG(I,K)=SQRT((SUMSQ-(SUM**2/N</td> <td>CNT))00042000</td>	359		IF (NCNT .GT. (3*NMBR/4)) SG(I,K)=SQRT((SUMSQ-(SUM**2/N	CNT))00042000
260 K = K + 1 000422 361 IBTT = IETT 000423 362 IETT = IETT + IAT 000424 263 NCNT = 0 000423 364 SUMSO = 0. 000423 365 SUMSO = 0. 000423 366 GC TO 510 000423 367 530 CCNTINUE 000423 368 S40 CONTINUE 000423 369 IBTT = FBT - IAT 000433 000433 370 NAVG = (IET - IBT) / IAT 000433 000433 371 IPAG = 1 000433 000433 C 000433 000435 000435 C 000435 000435 000435 C 000436 000436 000436 C 000437 000436 000436 C 000436 000436 000436 C 000437 000436 000436 C 000436 000436 000436 C 000436 000436 000436 C 000436 000436			1/(NCNT-1))	00042100
361 IBTT=IETT 000423 362 IETT=IETT+IAT 000424 363 NCNT=0 000425 364 SUM=0. 000427 365 SUMS0=0. 000427 366 GC TO 510 000428 367 530 CCNTINUE 000429 368 SA0 CCNTINUE 000423 369 IBTT=FBT-IAT' 000431 000433 370 NAVG=(IET-IBT)/AIAT 000433 000433 371 IPAG=1 000434 000435 C 000435 000436 000436 C 000436 000436 000437 C 000436 000436 000436 C 000437 000436 000436 C 000570 J=1, NAVG 000	360		K=K+1	00042200
362 IETT=IETT+IAT 000424 363 NCNT=0 000425 364 SUM=0. 000425 365 SUMSQ=0. 000425 366 GC TO \$10 000426 367 530 CCNTINUE 000426 368 540 C(NTINUE 000427 369 IBTT=FBT-IAT 000433 000433 370 NAVG=(IET-IBT)/IAT 000433 000433 371 IPAG=1 000435 000435 C 000436 000435 000435 C 000436 000436 000435 C 000437 000436 000435 C 000436 000436 000436 C 000437 000436 000436 C 000436 000436 000436 C 000436 000436 000436 C 000436 000436 000436 C 000437 000436 000436 C 000570 J=1, NAVG 003441 003443 373 ITIL(3,J	351		IBTT=IETT	00042300
363 NCNT=0 303425 364 SUM=0. 000425 365 SUMSQ=0. 000427 366 GC TO £10 000429 367 530 CCNTINUE 000423 368 S40 C(NTINUE 000433 370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000433 C 000433 000433 C 000434 000433 C 000435 000436 C 000436 000437 C 000437 000436 C 000436 000436 C 000436 000436 C 000437 000436 C 000436 000436 C 000437 000436 C 000436 000436 C 000437 000436 C 000	362		IETT=IETT+IAT	00042400
364 SUM=0. 000425 365 SUMSQ=0. 000427 366 GC TO \$10 000428 367 S30 CONTINUE 000425 368 S40 CONTINUE 000425 369 IBTT=FBT-IAT 000431 000433 370 NAVG=(IET-IBT)/IAT 000433 000433 371 IPAG=1 000435 000435 C 000435 000435 000435 C 000436 000436 000435 C 000435 000436 000436 C 000435 000436 000436 C 000436 000436 000437 C 000436 000436 000436 C 000436 000436 000436 C 000436 0004436 0004436 C 000436 0004436 0004436 C 000570 J=1, NAVG 0004436 0004436 373 ITTL(3,J)=C 0004436 0004436	353		NCNT=0	00042500
365 SUMSQ=0. 000427 366 GC TO £10 000429 367 530 CCNTINUE 000429 368 540 CCNTINUE 000433 370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000433 000 000433 000435 000 000436 000437 000 000436 000437 000 000437 000436 000 000436 000437 000 000437 000436 000 000437 000436 000 000436 000437 000 000437 000436 000 000437 000436 000 000437 000436 000 000437 000437 000 0004437 000436 000 0004430 000437 000 0004430 000437 000 0004437 000436 000 0004430 000437 000 000570 11, NAVG	3ć4		SUM=0 •	00042500
365 GC TO £10 00C428 367 530 CCNTINUE 000420 368 540 CCNTINUE 000430 369 IBTT=PBT-IAT 000433 370 NAVG=(IET-IBT)//IAT 000433 371 IPAG=1 000433 000435 000436 000436 000436 000437 000436 000437 000436 000436 000436 000436 000436 000437 000436 000436 000436 000436 000436 000437 000436 000436 000436 000436 000436 000436 000436 000436 000436 000436 000436 000436 000436 000436 000437 000436 000436 000436 000436 000436 000436 000436 000436 000570 000436 000436 000570 J=1, NAVG 000443 373 ITTL(3,J)=0 000444	365		SUMSQ=0	00042700
367 530 CCNTINUE 000429 368 540 CCNTINUE 000433 359 IBTT#PBT-IAT 000431 370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000434 C 000435 000435 C 000436 000435 C 000436 000436 C 000436 </td <td>366</td> <td></td> <td>GC TO \$10</td> <td>00042300</td>	366		GC TO \$10	00042300
368 540 CCNTINUE 000432 359 IBTT=IBT-IAT 000431 370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000434 C 000435 000435 C 000436 000435 C 000436 000436 C 000570 J=1, NAVG <td< td=""><td>367</td><td>530</td><td>CONTINUE</td><td>00042900</td></td<>	367	530	CONTINUE	00042900
359 IBTT=IBT-IAT 000431 370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000434 C 000435 000435 C 000436 000435 C 000437 000436 C 000436 000437 C 000437 000437 C 0004437 000437 C 0004437 0004437 C 0004442 0004427 373 ITTL(3.J)=C 0004442	368	540	CONTINUE	00043000
370 NAVG=(IET-IBT)/IAT 000433 371 IPAG=1 000433 C 000435 000435 C 000436 000435 C 000436 000435 C 000436 000436 C 000436 0004436 C 0004436 0004436 C 000440 0004426 372 D0 570 J=1. NAVG 0004436 373 ITTL(3.J)=C 0004446	369		IBTT=1BT-IAT	, 00043100
371 IPAG=1 000433 C 000435 C 000435 C 000435 C 000435 C 000436 C 000436 C 000436 C 000436 C 000437 C 000436 C 000437 C 000436 C 000436 C 000437 C 000436 C 000437 C 000437 C 000437 C 000439 O00440 0004439 O00440 0004421 372 D0 570 J=1. NAVG 0004423 373 ITTL(3.J)=C 000444	370		NAVG=(IET-IBT)/IAT	00043200
C 100434 C 100435 C 100435 C 100435 C 100437 C 100442 C 100444 C 100442 C 100444 C 1004	371		IPAG=1	00043300
C 00435 C 000436 C 000437 C 00437 C 000439 C 000449 C 00049 C 00049 C 00049 C 00049 C 00049 C 00049 C 00049 C 00000 C 00049 C 00000 C 0000 C 0000 C 00000 C 00000 C 00000 C 00		с		00043400
C 000436 C 000437 C 000437 C 000439 C 000449 C 00049 C 00049		č		00043500
C 000437 C 000437 C 00439 C 000449 C 000449 C THIS IS THE REPORT WRITING SECTION 000442 372 DD 570 J=1. NAVG 000442 373 ITTL(3.J)=C 000444		ċ	•	00043600
C C C C C C C C C C C C C C C C C C C		č		00043700
C 000439 C 000440 C 000440 C THIS IS THE REPORT WRITING SECTION 000442 372 DD 570 J=1. NAVG 000443 373 ITTL(3.J)=C 0000444		c		C 0043300
C 000440 C 000440 C THIS IS THE REPORT WRITING SECTION 000442 372 DO 570 J=1. NAVG 000443 373 ITTL(3.J)=C 000444		c		00043900
C 000441 C THIS IS THE REPORT WRITING SECTION 000442 372 DD 570 J=1. NAVG 000443 373 ITTL(3.J)=C 000444		c		· 00044000
C THIS IS THE REPORT WRITING SECTION 000442 372 DD 570 J=1. NAVG 000443 373 ITTL(3.J)=0 000444		č	· · ·	00044100
372 DD 570 J=1. NAVG 000443 373 ITTL(3.J)=C 000444		CTHI	S IS THE REPORT WRITING SECTION	00044200
373 ITTL(3,J)=C 000444	372		DO 570 J=1. NAVG	00044300
	373		ITTL(3,J)=C	00044400
374 ITTL(2+J)=0 300445	374	. N	ITTL(2.J)=0	20044500
375 ITTL(1,J)=0 000-46	375		ITTL(1,J)=0	00044600

376		TSP{1,J}=0.	00044700
377		T\$P(2,J)=0.	60044800
278		DC 545 I=1, 6	00044900
379		SCT(11.I.J)=0.	00045000
380		ITC(11. I. J)=0	20045100
351	545	CENTINUE	00345200
362		DD 560 I=1. 11	10045300
383		IF (I .EQ. 11) GO TO 546	00045400
384		$ITC(I, 6, J) \stackrel{i}{=} ITC(I, 1, J) + ITC(I, 2, J) + ITC(I, 3, J) + ITC(I, 4, J)$	20245500
385		SCT(I, 6, J) = SCT(I, 1, J) + SCT(I, 2, J) + SCT(I, 3, J) + SCT(I, 4, J)	00045500
386	546	CCATINUE	30045700
337		DC 550 K=1.6	00045900
388		IF (I .E2. 11) GC TC 548	00045900
289		ITC(11, K, J) = ITC(11, K, J) + ITC(I, K, J)	00046305
390		SCT(11, K, J) = SCT(11, K, J) + SCT(1, K, J)	00346100
391	548	CENTINUE	30046200
392		IF (ITC(I,K,J) \rightarrow NE 0)SCT(I,K,J)=(SCT(I,K,J)/(TC(T,K,J))+1.4)	00046300
393	550	CENTINUE	20346400
394	560	CENTINUE	00046500
395		TTT (3,) = TTC(11, 6,)	00046600
396		TSP(3,1)=SCT(11,6,1)	60046700
397			00046300
398			00046900
399			00047000
400			00047000
401		TSP(1, n) = TSP(1, n) + SCT(1, 6, n) + TC(1, 6, n)	00047200
402		$T \subseteq \{1, 2, 3\} = \{2, 3\} = \{2, 3\} = \{2, 3\} = \{1, 3\} = \{2,$	00047200
403	565		00047400
404	505	IF = (ITT) (I + I) = NF = 0 (I + I) = TSD(I + I) = TTT (I + I)	00047400
A 3 5		$\mathbf{F} = \{\mathbf{T}, \mathbf{T}, $	00047600
406			00047000
407		$\mathbf{F} = \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \mid \mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \mid \mathbf{F} \mid \mathbf{F} \mid \mathbf{F} \in \{\mathbf{F} \mid \mathbf{F} \mid $	CO047800
408			00047900
400			03048000
A10			C 3048100
415		$ \begin{array}{c} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} \mathbf{A} A$	00048201
		$= P_1 + (1 + 0) + (2 + 0) + (1 + 0) + (1 + 1) + (1 + 0) + (2 + 0$	00048300
		$\frac{1}{2} \left(\frac{1}{2} - \frac{1}{2} + 1$	00048430
		230(23)3) + (1)((1)(2)(3)(1)(1)(1)(1)(1)(1)(3)(1)(3)(1)(3)(1)(3)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)(1)	AC 0048500
		$ \begin{array}{c} \mathbf{J}_{1} - \mathbf{i}_{1} \mathbf{j}_{1} \mathbf{i}_{2} \mathbf{j}_{1} \mathbf{i}_{1} \mathbf{j}_{2} \mathbf{j}_{1} - \mathbf{j}_{2} \mathbf{j}_{2} \mathbf{j}_{1} $	00048600
	•	= j + j + j + j + j + j + j + j + j + j	0048700
412		$ = \sum_{i=1}^{n} \sum_{j=1}^{n} \sum_{i=1}^{n} \sum$	00048866
-12		while $(0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,$	00043900
		= 50(36, 5) + (1(0)(1(0), 5) + 1(1(0), 5) + (1(0),	00046000
		= 30(3) + 37 + 87 + 37 + 11 + 11 + 11 + 11 + 11 + 11 + 1	00049100
		$(1, M \times 1) \rightarrow 1 \downarrow \downarrow$. 15040200
		14/14/14/14/14/14/14/14/14/14/14/14/14/1	000049200
		6(2(1)))1=21+22+21+26(24)1	00049300
413	570		00049400
414			00049300

DC 575 I=1-11 DO 575 J=42.64 I2=I2+IE(I,J) 575 CONTINUE 578 CONTINUE CALL DMRD(12) 580 CONTINUE REWIND 1 590 CONTINUE ' WRITE (6.6010) C CCC53700 С С С C C C THESE ARE THE FORMATS RESPONSIBLE FOR THE READS & D WRITES. 1000 FORMAT (315,115.65(1115)) 1010 FORMAT (315.115.15.100A2) 1020 FORMAT (315,115,3110) 1030 FORMAT (315.115) 1040 FCRMAT (315,115,7(15,F5,1)) -1950 FCRMAT (318,115,15,2(250F10.2)) 5000 -FERMAT (3110) 5010 FORMAT (15) 5020 FORMAT (420) 6000 FORMAT (+ +,12,+:+,12,+ NOTE:+, 5042) 6010 FORMAT (111) CCGE2400 6020 FORMAT (24X,1116,5X,4F7+2,F9+1, /, 24X,11F6+1,5X,4F7+3,F9+4,//, 00052500 124X,1116,5X,4F7.2, /, 24X,11F6.1,5X,4F7.3, /,2(/ 24X,1116,5X, C0052500 25F7.2. /. 24X,11F6.1.5X,5F7.3. /)) 6030 FORMAT (24X,1116,19X,F7.2./,24X,11F6.1.19X,F7.4.//, 24X,1016.25X,F7.2, /, 24X,10F6.1,25X,F7.4, //.8X,F7.2, 00052900 20X, 17, 23X, 17, 23X, 4F7, 2, /, 8X, F7, 4, 20X, F7, 1, 23X, F7, 1, 223X,4F7.4, //, 3X,F7.2.35X,17,38X,4F7.2, /, 8X,F7.4,35X, 2F7.1.38X.4F7.4) 6040 FORMAT (////,40X.13." NINUTE AVERAGE AT ".12.":".12.10X."FILE: ". 00053300 >A20) STOP 44C END SUBROUTINE DMRD(I) IF (1.EQ.C) RETURN 1.1=1.I READ (1,190) K I CONTINUE 100 FORMAT (15) RETURN END

 449
 SUBROUTINE ITIM(I.J.K.L)

 450
 I=L/360000

 451
 J=L/600-I*60

 452
 K=L/100-J*60-I*3600

 453
 RETURN

 454
 END

//SCATA