

T. STANLEY
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POLLUTANT STANDARD INDEX (PSI)
MULTI-POLLUTANT RETRIEVAL SOFTWARE

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1.0.0 INTRODUCTION

Under a joint contract involving the Office of Monitoring and Technical Support, the Office of Air Quality Planning and Standards, and the Council on Environmental Quality, Systems Research and Development Corporation (SRD) has developed specialized software for retrieving raw air quality data from SAROAD files.

These computer programs are very flexible and permit the user to specify:

- (1) One to five different air pollutants (CO, Ozone, NO₂, SO₂ and TSP).
- (2) A specific State or all states.
- (3) A specific geographical area or all areas.
- (4) A specific site or all sites.
- (5) A specific agency or all agencies.
- (6) A specific project or all projects.
- (7) A specific year.
- (8) The specific method, interval and units for the pollutants in (1).
- (9) Any combination of (2) thru (8).

Using either of two programs, INTRFAC1 and INTRFAC2, the user can obtain the raw hourly data values for each hour in the year for each unique 12 character station code retrieved (INTRFAC1) or the daily maximum of the raw hourly data values for each day in the year for each unique 12 character station code retrieved (INTRFAC2). The output format of the two programs are the same. The output consists of 80-character card image records which can be punched onto cards, stored on a disk punch file, or stored on tape as a EBCDIC, fixed length, fixed block, card image IBM 370 compatible formatted file. The output formats are specifically designed to be used with the PSI air pollution index programs but can be used as input to any other software as well.

2.0.0 AIR QUALITY DATA RETRIEVAL COMPUTER PROGRAMS

Three computer programs make up the Air Quality Data Retrieval Software. These programs are INTRFAC1, INTRFAC2, and INTRFACSUB. Program INTRFAC1 retrieves the raw hourly data values for each hour in the year for each unique 12 character station code for each pollutant-method-interval-units specified. Program INTRFAC2 retrieves the daily maximum of the raw hourly data values for each day in the year for each unique 12 character station code for each pollutant-method-interval-units specified. Program INTRFACSUB is a utility program designed to update the non-continuous data files used as input to programs INTRFAC1 and INTRFAC2. Programs INTRFAC1 and INTRFAC2 were designed to be run in demand mode as well as batch mode. The Air Quality Data Retrieval Programs were designed to be run in the demand mode on the tele-type terminals with a 132-character carriage. However, it is possible to run the programs on a CRT terminal.

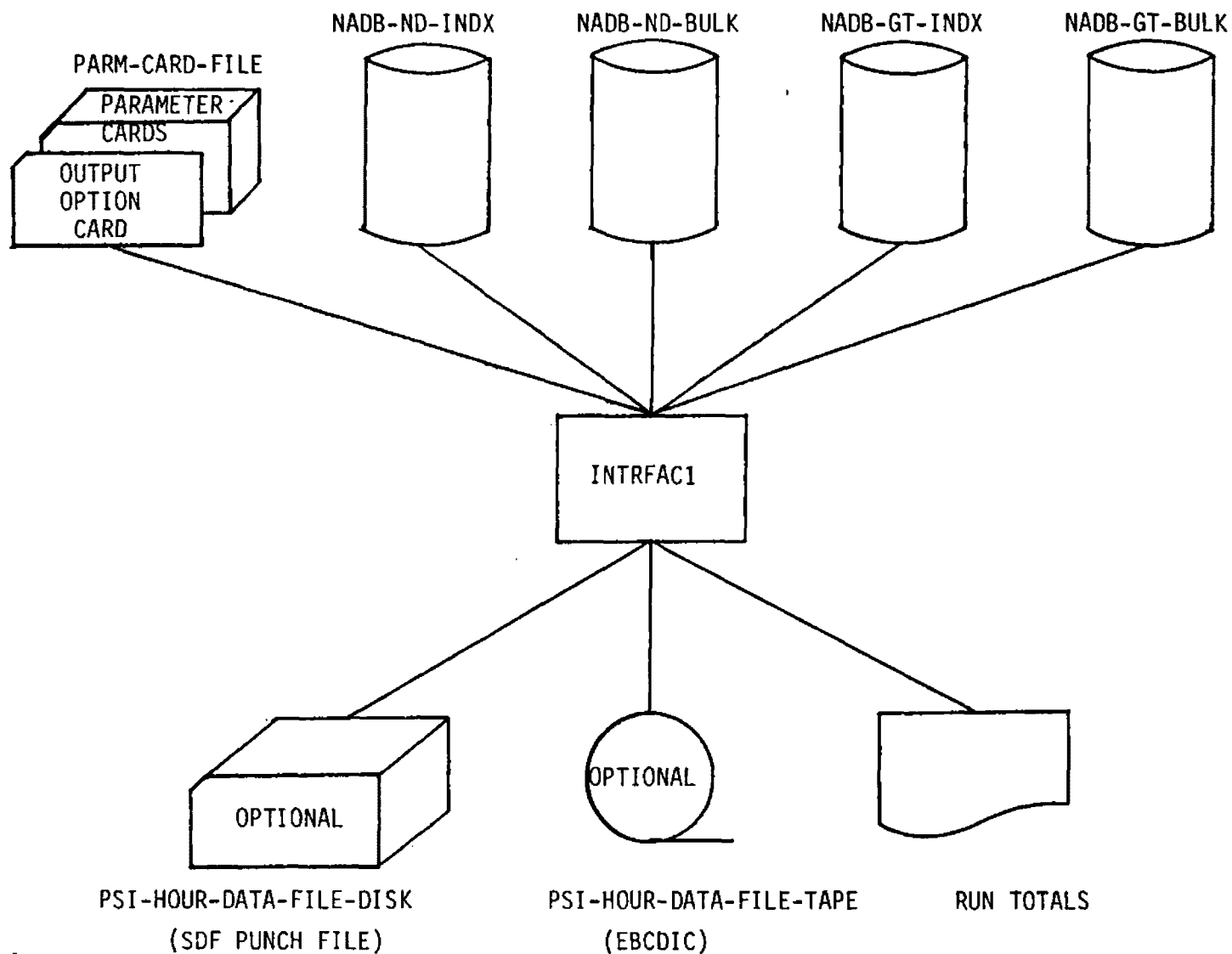
2.1.0 INTRFAC1

2.1.1 Description

Program INTRFAC1 selects continuous CO, O₃, and NO₂ and non-continuous SO₂ and TSP from SAROAD data files and creates an 80 character card image file on disk and/or tape. The disk file created is an SDF punch file which can be saved and punched. The tape file is an EBCDIC IBM compatible file which can be processed by a COBOL or FORTRAN program. Both files are optional and can be selected by the user by inputting an option card indicating which type file is to be outputted. Selection parameter cards are used to specify to the program the selection criteria for the site-id, year and CO, O₃, NO₂, SO₂, and TSP pollutants by which SAROAD records are selectively retrieved.

The data file(s) generated is composed of 80 character card image records consisting of the data value readings for each of the pollutants specified for each hour in the year specified on the parameter card. In other words, each character record outputted corresponds to each hour in the year specified and contains the data value reading for each pollutant (CO, O₃, NO₂, SO₂ and/or TSP) specified corresponding to each hour. Each parameter card will generate 8,760 or 8,784 80 character card image records depending upon whether or not the specified year is a leap year.

2.1.2 INTRFAC1 Program Flow Diagram



2.1.3 INTRFAC1 Operating Instructions

Procedure Listing (ECL)

1. @RUN
2. @ASG,T PARMCARDFILE.
3. @DATA,IL PARMCARDFILE.
 'OUTPUT OPTION CARD'

 'PARAMETER CARDS'
4. @END
- *5. @USE PSI-HOUR-DSK., 'USER-FILE-NAME.'
- *6. @ASG,A PSI-HOUR-DSK.
- *7. @ASG,TJ/W PSI-HOUR-TPE.,16N/////Q, 'TAPE-REEL-NUMBER'
8. @ASG,A NADB*NADB-ND-INDX.
9. @ASG,A NADB*NADB-ND-BULK
10. @ASG,A TRRP*NADB-GT-INDX.
11. @ASG,A TRRP*NADB-GT-BULK.
12. @XQT TRRP*BENNETTFILE.INTRFAC1
- *13. @FREE PSI-MAXX-DSK.
14. @SYM PSI-MAXX-DSK., 'CARD-PUNCH-ID'
15. @FIN

*NOTE

The inclusion of ECL statements 5 and 6 and/or 7 is dependent upon the contents of the 'OUTPUT OPTION CARD' in PARMCARDFILE as follows:

- A. If output option is 'DISK', the user need only include ECL statements 5 and 6. On ECL statement 5, the user must supply 'USER-FILE-NAME.' where 'USER-FILE-NAME.' is the name of a catalogued file where output records are to be punched and saved.
- B. If output option is 'TAPE', the user need only include ECL statement 7. On ECL statement 7, the user must supply 'TAPE-REEL-NUMBER' where 'TAPE-REEL-NUMBER' is the reel number of the tape where output records are to be written.
- C. If output option is 'BOTH', the user must include all three ECL statements (5, 6, and 7) and supply the necessary information as illustrated in A and B above.

ECL statements 13 and 14 should be included only when cards are desired to be punched. If ECL statements 13 and 14 are included, then statements 5 and 6 must also be included. 'CARD-PUNCH-ID' on ECL statement 14 is the card-punch to which cards are to be routed and punched. The user must supply this information.

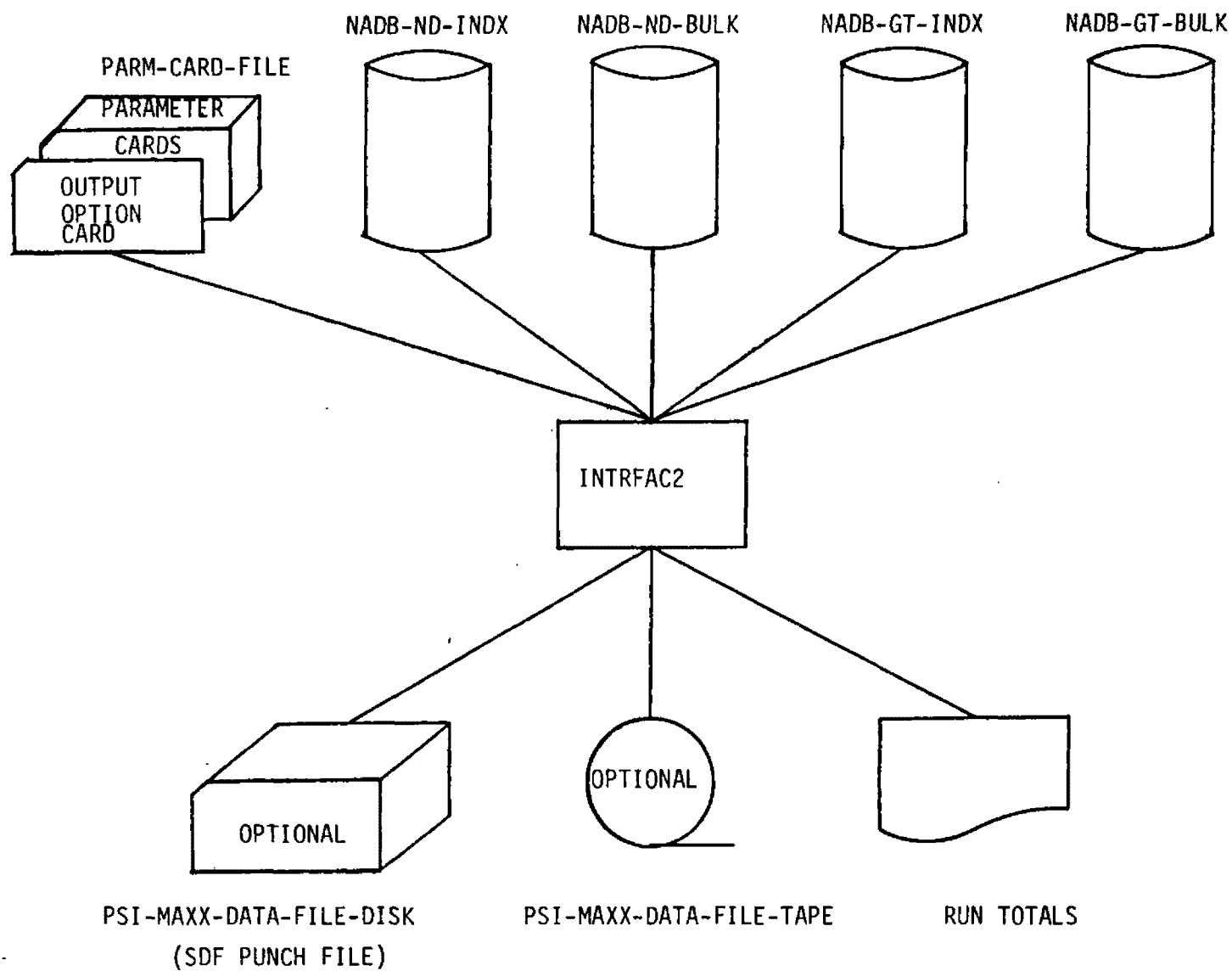
2.2.0 INTRFAC2

2.2.1 Description

Program INTRFAC2 selects continuous CO, OZ, and NO₂ and non-continuous SO₂ and TSP from SAROAD data files and creates an 80 character card image file on disk and/or tape as does program INTRFAC1. The disk file created is an SDF punch file which can be saved and punched. The tape file is an EBCDIC IBM compatible file which can be processed by a COBOL or FORTRAN program. Both files are optional and can be selected by the user by inputting an option card indicating which type file is to be outputted. Selection parameter cards are used to specify to the program the selection criteria for the site-id, year and CO, OZ, NO₂, SO₂, and TSP pollutants by which SAROAD records are selectively retrieved.

The data file(s) generated is composed of 80 character card image records consisting of the daily maximum hourly data value reading for each of the pollutants specified for each day in the year specified on the parameter card. In other words, each 80 character record outputted corresponds to each day in the year specified and contains the daily maximum hourly data value reading for each pollutant (CO, OZ, NO₂, SO₂, and/or TSP) specified corresponding to each day. Each parameter card will generate 365 or 366 80 character card image records depending upon whether or not the specified year is a leap year.

2.2.2 INTRFAC2 Program Flow Diagram



2.2.3 INTRFAC2 Operating Instructions

Procedure Listing (ECL)

1. @RUN
2. @ASG,T PARMCARDFILE.
3. @DATA,IL PARMCARDFILE.
 'OUTPUT OPTION CARD'

 'PARAMETER CARDS'
4. @END
- *5. @USE PSI-MAXX-DSK.,'USER-FILE-NAME.'
- *6. @ASG,A PSI-MAXX-DSK.
- *7. @ASG,TJ/W PSI-MAXX-TPE.,16N////////Q,'TAPE-REEL-NUMBER'
8. @ASG,A NADB*NADB-ND-INDX.
9. @ASG,A NADB*NADB-ND-BULK.
10. @ASG,A TRRP*NADB-GT-INDX.
11. @ASG,A TRRP*NADB-GT-BULK.
12. @XQT TRRP*BENNETTFILE.INTRFAC2
- *13. @FREE PSI-MAXX-DSK.
14. @SYM PSI-MAXX-DSK.,,'CARD-PUNCH-ID'
15. @FIN

*NOTE

The inclusion of ECL statements 5 and 6 and/or 7 is dependent upon the contents of the 'OUTPUT OPTION CARD' in PARMCARDFILE as follows:

- A. If output option is 'DISK', the user need only include ECL statements 5 and 6. On ECL statement 5, the user must supply 'USER-FILE-NAME.' where 'USER-FILE-NAME.' is the name of a catalogued file where output records are to be punched and saved.
- B. If output option is 'TAPE', the user need only include ECL statement 7. On ECL statement 7, the user must supply 'TAPE-REEL-NUMBER' where 'TAPE-REEL-NUMBER' is the reel number of the tape where output records are to be written.
- C. If output option is 'BOTH', the user must include all three ECL statements (5, 6 and 7) and supply the necessary information as illustrated in A and B above.

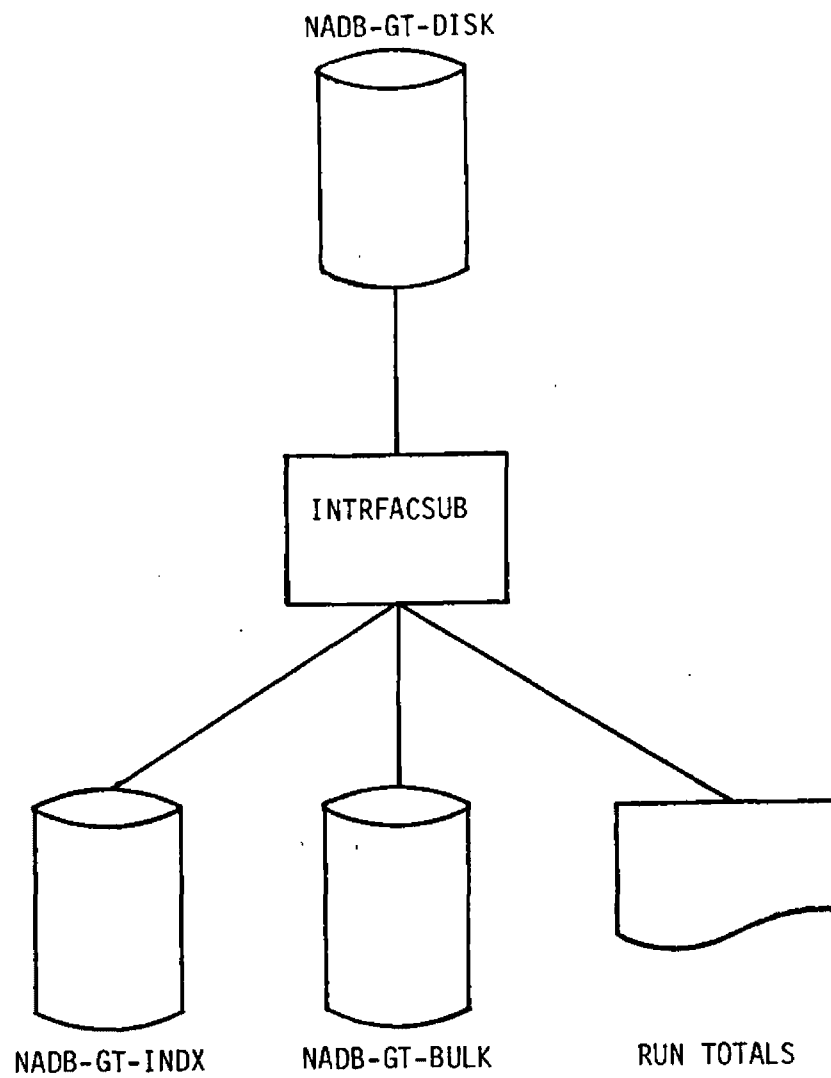
ECL statements 13 and 14 should be included only when cards are desired to be punched. If ECL statements 13 and 14 are included, then statements 5 and 6 must also be included. 'CARD-PUNCH-ID' on ECL statement 14 is the card-punch to which cards are to be routed and punched. The user must supply this information.

2.3.0 INTRFACSUB

2.3.1 Description

Program INTRFACSUB is a utility program which is used to update the non-continuous data files used as input to programs INTRFAC1 and INTRFAC2. This program selects all SO₂ and TSP site records from the SAROAD old formatted files for years from 73 to present and generates the non-continuous data files used in retrieving data. INTRFACSUB generates non-continuous data files containing only SO₂ and TSP pollutant data in a format to facilitate retrieval by programs INTRFAC1 and INTRFAC2.

2.3.2 INTRFACSUB Program Flow Diagram



2.3.3 INTRFACSUB Operating Instructions

Procedure Listing (ECL)

1. @RUN
2. @ASG,A NADB*NADB-GT-DISK.
3. @ASG,A TRRP*NADB-GT-INDX.
4. @ASG,A TRRP*NADB-GT-BULK.
5. @XQT TRRP*BENNETTFILE.INTRFACSUB
6. @FIN.

3.0.0 EXECUTION OF INTERFACE PROGRAMS FROM TERMINAL

Required ECL:

1. @ADD,L TRRP*BENNETTFILE.ADD-SSG
2. @EOF
3. @EOF
4. @END
5. @ADD,L BRKFILE.

Control Cards:

- | | | |
|----------|----|-------------------------------------|
| REQUIRED | 1. | EXECUTE "PROGRAM" |
| OPTIONAL | 2. | DISK FILE NAME IS "FILENAME" |
| OPTIONAL | 3. | TAPE FILE REEL NUMBER IS "REEL-NUM" |
| OPTIONAL | 4. | PUNCH CARDS AT PUNCH "CARD-PUNCH" |

Explanation of Control Cards:

1. Control card #1

This card is required and its purpose is to tell the system which "PROGRAM" (INTRFAC1 or INTRFAC2) to execute.

2. Control card #2

This card is optional and when specified indicates to the system a disk file where the user wishes his cards to be punched and saved. If not specified, the system punch file is deleted, deleting all punched output.

3. Control card #3

This card is optional and when specified indicates to the system the reel number of the tape to which the 80 character cards are to be written.

4. Control card #4

This card is optional and indicates to the system where the cards generated are to be punched. This card should only be used when neither control card #2 and #3 are specified or when control card #2 only is specified. This is because punch cards can only be punched from the user specified disk file or the system default disk file. System disk file default occurs when neither control card #2 and #3 are specified.

Execution

Step 1. Enter the following ECL statement:

```
@ADD,L TRRP*BENNETTFILE.ADD-SSG
```

Step 2. When the terminal returns with a ready state enter the following required control card #1.

```
EXECUTE INTRFAC2 (or INTRFAC1)
```

If the user wishes to specify any of the optional control cards, he should enter them following the EXECUTE control card.

When all control cards have been entered, type in two @EOF ECL statements.

At this point, the control cards entered will be checked for format validity. If errors are detected in the control cards, error messages describing the particular error will be printed. If errors are detected and the user wishes to start again, he should type in

```
@ADD,L TRRP*BENNETTFILE.ADD-SSG
```

which will start at Step 1 again.

Step 3. At this point, if no errors are detected in the control cards, an @DATA ECL statement should have been generated automatically which will allow the user to now enter his parameter cards when the terminal is in a ready state.

Step 4. When all parameter cards have been entered, the user must then enter the two following ECL statements:

```
@END
```

```
@ADD,L BRKFILE.
```

After Step 4, the system will then proceed to execute the program specified in the control cards.

4.0.0 LISTING INTRFAC1 AND INTRFAC2 OUTPUT

Utility software is available to list the disk and tape files generated by programs INTRFAC1 and INTRFAC2. The listing produced by the utility software identifies each record on the file with a sequence number and prints a column scale to aid in determining record column positions. Execution of the list utility software is described in 4.1 and 4.2.

4.1.0 Listing INTRFAC1 and INTRFAC2 Disk Output

The following ECL statements list the disk file created by programs INTRFAC1 and INTRFAC2:

1. @RUN
2. @ASG,T PARMCARD.
3. @DATA,IL PARMCARD.
4. 000800000100001
5. @END
- *6. @ASG,A 'USER-FILE-NAME.'
- *7. @USE LIST-FILE.,'USER-FILE-NAME.'
8. @XQT TRRP*BENNETTFILE.LIST-DISK
9. @FIN

*NOTE

ECL statements 6 and 7 require the user to substitute 'USER-FILE-NAME.' with the filename of the disk file created by INTRFAC1 or INTRFAC2.

4.2.0 Listing INTRFAC1 and INTRFAC2 Tape Output

The following ECL statements list the tape file created by programs INTRFAC1 and INTRFAC2:

1. @RUN
2. @ASG,T PARMCARD.
3. @DATA,IL PARMCARD.
4. 000800000100001
5. @END
- *6. @ASG,TJ/R PSI-HOUR-TPE.,16N/////Q,'TAPE-REEL-NUMBER'
7. @XQT TRRP*BENNETTFILE.LIST-TAPE
8. @FIN

***NOTE**

ECL statement 6 requires the user to substitute 'TAPE-REEL-NUMBER' with the reel number of the tape file created by INTRFAC1 or INTRFAC2.

5.0.0 PERMISSIBLE POLLUTANT, METHOD, INTERVAL, UNITS COMBINATIONS

POLLUTANT	POLLUTANT CODE	POLLUTANT METHOD	POLLUTANT INTERVAL	POLLUTANT UNITS
CO	42101	11,21	Z	05
OZONE	44101	13,14,15	1	01,07
	44201	11,13	1	01,07
NO ₂	42602	11,12,13,14	1	01,07
SO ₂	42401	11,13,14, 15,16,31, 33	X	01,07
	42401	91	7	01,07
TSP	11101	91	7	01,07

6.0.0 PROGRAM INPUTS

Programs INTRFAC1 and INTRFAC2 both use the same type of user-supplied input data. Both require an option card followed by selection parameter cards. The option card indicates to both programs what type of output file to generate (i.e., disk file, tape file, or both disk and tape files). The selection parameter cards provides the selection criteria by which both programs will select and retrieve SAROAD data records. The format of the option card and selection parameter cards is the same for both programs.

6.1.0 Output Option Card Format

<u>Card Column</u>	<u>Item Description</u>	<u>Permissible Value</u>
1	Output option card indicator	Must be '1'.
2	Not used	Blank.
3-6	Type file to output	'DISK', disk output only. 'TAPE', tape output only. 'BOTH', both disk and tape output.

6.2.0 Selection Parameter Card Format

<u>Card Column</u>	<u>Item Description</u>	<u>Permissible Value</u>
1-2	State	'01' thru '55' for a specific State or '\$\$' for all States.
3-6	Area	'0000' thru '9999' for a specific Area or '\$\$\$\$' for all Areas.
7-9	Site	'000' thru '999' for a specific Site or '\$\$\$' for all Sites.
10	Agency	'A' thru 'Z' for a specific Agency or '\$' for all Agencies.
11-12	Project	'01' thru '99' for a specific Project or '\$\$' for all Projects.
13	Not used	Blank.
14-15	Year	'73' thru '99'.
16	Not Used	Blank.
17-21	CO pollutant code	'42101' or '\$\$\$\$\$' if no CO records are to be selected.
22	Not used	Blank.

<u>Card Column</u>	<u>Item Description</u>	<u>Permissible Value</u>
23-24	CO method code	'11', '21', or '\$\$' if no CO records are to be selected.
25	CO interval code	'Z' or '\$' if no CO records are to be selected.
26-27	CO units code	'05' or '\$\$' if no CO records are to be selected.
28	Not used	Blank.
29-33	Ozone pollutant code.	'44101', '44201' or '\$\$\$\$\$' if no Ozone records are to be selected.
34	Not used	Blank.
35-36	Ozone method code	44101: '13' thru '15'. 44201: '11', '13'. '\$\$', if no Ozone records are to be selected.
37	Ozone interval code	'1' or '\$' if no Ozone records are to be selected.
38-39	Ozone units code	'01', '07', or '\$\$' if no Ozone records are to be selected.
40	Not used	Blank.
41-45	NO ₂ pollutant code	'42602' or '\$\$\$\$\$' if no NO ₂ records are to be selected.
46	Not used	Blank.
47-48	NO ₂ method code	'11' thru '14' or '\$\$' if no NO ₂ records are to be selected.
49	NO ₂ interval code	'1' or '\$' if no NO ₂ records are to be selected.
50-51	NO ₂ units code	'01', '07', or '\$\$' if no NO ₂ records are to be selected.
52	Not used	Blank.
53-57	SO ₂ pollutant code	'42401' or '\$\$\$\$\$' if no SO ₂ records are to be selected
58	Not used	Blank.
59-60	SO ₂ method code	'11', '13' thru '16', '31', '33', '91', or '\$\$' if no SO ₂ records are to be selected.

<u>Card Column</u>	<u>Item Description</u>	<u>Permissible Value</u>
61	SO ₂ interval code	'X' for methods '11', '13' thru '16', '31', '33'. '7' for method '91'. '\$' if no SO ₂ records are to be selected.
62-63	SO ₂ units code	'01', '07' or '\$\$' if no SO ₂ records are to be selected.
64	Not used	Blank.
65-69	TSP pollutant code	'11101' or '\$\$\$\$\$' if no TSP records are to be selected.
70	Not used	Blank.
71-72	TSP method code	'91' or '\$\$' if no TSP records are to be selected.
73	TSP interval code	'7' or '\$' if no TSP records are to be selected.
74-75	TSP units code	'01', '07' or '\$\$' if no TSP records are to be selected.
76-80	Not used	Blank.

7.0.0 PROGRAM OUTPUTS

Programs INTRFAC1 and INTRFAC2 generate output files consisting of 80-character card image records. The output record format used in both programs are the same with a one field value being the exception. All pollutant value fields contain the value 99999.99 to indicate a missing value.

7.1.0 INTRFAC1 Output Record Format

<u>Card Column</u>	<u>Item Description/Content</u>
1-2	Not used, blank.
3-14	12 character station code consisting of STATE-AREA-SITE-AGENCY-PROJECT.
15	Not used, blank.
16-21	Date in YYMMDD format.
22	Not used, blank.
23-29	CO hourly value in F7.2 format.
30	Not used, blank.
31-37	Ozone hourly value in F7.2 format.
38	Not used, blank.
39-45	NO ₂ hourly value in F7.2 format.
46	Not used, blank.
47-53	SO ₂ hourly value in F7.2 format.
54	Not used, blank.
55-61	TSP hourly value in F7.2 format
62	Not used, blank.
63-64	Hour of the day (i.e. 1,2,3,-----,23,or 24)
65	Not used, blank.
66-67	CO method code.
68	CO units code (units digit).
69-70	Ozone method code.
71	Ozone units code (units digit).

<u>Card Column</u>	<u>Item Description/Content</u>
72-73	NO ₂ method code.
74	NO ₂ units code (units digit).
75-76	SO ₂ method code.
77	SO ₂ units code (units digit).
78-79	TSP method code.
80	TSP units code (units digit).

7.2.0 INTRFAC2 Output Record Format

<u>Card Column</u>	<u>Item Description/Content</u>
1-2	Not used, blank.
3-14	12 character station code consisting of STATE-AREA-SITE-AGENCY-PROJECT.
15	Not used, blank.
16-21	Date in YYMMDD format.
22	Not used, blank.
23-29	CO daily maximum value in F7.2 format.
30	Not used, blank.
31-37	Ozone daily maximum value in F7.2 format.
38	Not used, blank.
39-45	NO ₂ daily maximum value in F7.2 format.
46	Not used, blank.
47-53	SO ₂ daily maximum value in F7.2 format.
54	Not used, blank.
55-61	TSP daily maximum value in F7.2 format.
62	Not used, blank.
63-64	Always zero.
65	Not used, blank.
66-67	CO method code.
68	CO units code (units digit).

<u>Card Column</u>	<u>Item Description/Content</u>
69-70	Ozone method code.
71	Ozone units code (units digit).
72-73	NO ₂ method code.
74	NO ₂ units code (units digit).
75-76	SO ₂ method code.
77	SO ₂ units code (units digit).
78-79	TSP method code.
80	TSP units code (units digit).

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