https://ntrs.nasa.gov/search.jsp?R=19820004921 2020-03-21T10:04:56+00:00Z

N O T I C E

THIS DOCUMENT HAS BEEN REPRODUCED FROM MICROFICHE. ALTHOUGH IT IS RECOGNIZED THAT CERTAIN PORTIONS ARE ILLEGIBLE, IT IS BEING RELEASED IN THE INTEREST OF MAKING AVAILABLE AS MUCH INFORMATION AS POSSIBLE

(NASA-TM-83811) THE GLAS EDITING PROCEDURES FOR THE FGGE LEVEL II-B DATA COLLECTED DURING SOP-1 AND 2 (NASA) 30 p
HC A03/MF A01 CSCL 09B

N82-12794

Unclas
G3/60 03297

NASA

Technical Memorandum 83811

The GLAS Editing Procedures for the FGGE Level II-b Data Collected during SOP-1 and 2

W. Baker, D. Edelmann, H. Carus

September 1981

Laboratory for Atmospheric Sciences
Modeling and Simulation Facility

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771

The GLAS Editing Procedures for the FGGE Level II-b Data Collected during SOP-1 and 2

W. Baker

Laboratory for Atmospheric Sciences

D. Edelmann and H. Carus

Sigma Data Services Corporation

September 1981

National Aeronautics and Space Administration
Goddard Space Flight Center
Greenbelt, MD 20771

FOREWORD

This technical memorandum has been prepared as a documentation of the objective procedures developed at the Laboratory for Atmospheric Sciences to edit the FGGE Level II-b data. The document should be a useful reference for scientists conducting observational and model studies with the FGGE data.

Wayman E. Baker
1 September 1981

ACKNOWLEDGMENTS

We gratefully acknowledge the encouragement and support of Dr. Halem and the helpful comments of Dr. E. Kalnay. We also benefitted from discussions with Drs. T. Kaneshige, G. DiMego, A. Hollingsworth, P. Julian, and F. Mosher.

The report was typed by Ms. L. Thompson and Ms. J. Reckley, and Ms. L. Rumburg drafted the figure.

LIST OF ACRONYMS

AIDS	-	Aircraft Integrated Data System
AIREP	-	Aircraft Report
ASDAR	-	Aircraft to Satellite Data Relay
CMS	-	Conversational Monitor System
CODAR	-	Coded AIREP
COLBA	-	Constant Level Balloon
DRIBU	-	Drifting Buoy
DSI	-	Data Source Index
ECMWF	-	European Center for Medium Range Weather Forecasts
FGGE	-	First GARP Global Experiment
FORTRAN	-	Formula Translation
GARP	-	Global Atmospheric Research Program
GLAS	-	GSFC Laboratory for Atmospheric Sciences
IDPT	-	Indicator for the Data Processing Technique
IT	-	Instrument Type
LIMS	-	Limb Infrared Monitor of the Stratosphere
MVS	-	Multiple Virtual Storage
NESS	-	National Environmental Satellite Service
NMC	-	National Meteorological Center
NOAA	-	National Oceanic and Atmospheric Administration
SARAD	-	Satellite Radiances
SATEM	-	Satellite Temperature
SATOB	-	Satellite Observation
SOP	-	Special Observing Period
SPCF	-	Subjective Pressure Confidence Factor

TSWD - Type of Satellite Wind Derivation

TWOS - Tropical Wind Observing Ship

VTPR - Vertical Temperature Profile Radiometer

TABLE OF CONTENTS

	Page
Foreword	ii
Acknowledgments	iii
List of Acronyms	iv
1. Introduction	1
2. FGGE Level II-b Data Set Organization	2
3. Modifications to the Database by Data Type	4
3.1 Rawinsonde Data	4
3.2 Pilot Balloon Data	4
3.3 TWOS Radar Sounding Data	4
3.4 TWOS NAVAID Sounding Data	4
3.5 Aircraft Dropwindsonde Data	4
3.6 Constant Level Balloon Data	4
3.7 Experimental Satellite Stratospheric Sounding Data (LIMS)	5
3.8 Aircraft Data - ASDAR	5
3.9 Aircraft Data - AIDS	5
3.10 Aircraft Data - Conventional (AIREP and CODAR)	5
3.11 Manual and Automatic Surface Land Observations	5
3.12 Surface Observations from Fixed and Mobile Ships	5
3.13 Surface Observations from Environmental Buoys	5
3.14 Satellite Sounding Data	5
3.15 Satellite Clear-Radiance Data	6
3.16 Satellite Cloud-Track Wind Data	6
3.17 Satellite Cloud Data	8
3.18 Satellite Sea Surface Temperature Data	8
3.19 Oceanographic Data	8

3.20 Drifting Buoy Data 8

3.21 Summary of the Database Modifications during SOP-1 and 2 9

4. Automated Editing Procedures 10

4.1 Program Organization 10

4.2 Permanent Data Sets 11

4.2.1 Sweden Level II-b Main Data 11

4.2.2 Wisconsin Reprocessed Japanese Cloud-Motion Winds 11

4.2.3 Edited Level II-b Main Data 11

4.2.4 Scripps Topography 11

4.2.5 Coordinate Corrections 11

4.2.6 Restart File 12

4.2.7 Namelist File 12

4.3 Program Execution 12

4.4 Flow Diagram of the Program Logic 13

5. Summary. 20

References 21

1. INTRODUCTION

In any study which utilizes atmospheric observations, an important step is a check on the reasonableness of the data. The database modifications documented here should not be considered as a substitute for the usual data checks (e.g. hydrostatic balance). Rather, they should be viewed as a supplement to the usual editing procedures.

In developing the FORTRAN program to perform the modifications to the database, we relied on the previous work and experience of a number of individuals. P. Kallberg of ECMWF provided a list of stations known to have had incorrect geographical locations as well as numerous other corrections. Rawinsonde thermistor corrections were performed with routines provided by G. Costello and J. Laver of NMC. The TIROS-N temperature soundings file was checked against a set of problems documented by NESS. Oceanic microwave retrievals from TIROS-N with precipitable water contamination were eliminated following the suggestion of Phillips (1980).

Section 2 outlines the FGGE Level II-b data set organization. A detailed description of the modifications made to the database by data type is presented in Section 3. In Section 4, the FORTRAN program to perform the editing is described. A summary follows in Section 5.

2. FGGE LEVEL II-B DATASET ORGANIZATION

The international exchange format for the level II-b data specifies eight distinct data formats for encoding the complete set of data types collected during FGGE. These formats, and the corresponding data types, are described in Table 1.

Table 1. Level II-b data types associated with the international tape exchange formats (Staff of the GARP Activities and the Participants in the FGGE Data Management Scheme, 1978). DSI denotes the Data Source Index.

Data Type \ Data Format	DSI	Upper-Air	Arcrft.	Surface	Sat. Snding.	Sat. Clear Rad.	Sat. Wind/ SST	Oceano-graphic	Drift. Buoy
TEMP	11	X							
PILOT	12	X							
TWOS RADAR	13	X							
TWOS NAVAID	14	X							
TEMP DROP	15	X							
COLBA	16	X							
NIMBUS-G/LIMS	17	X							
ASDAR	21		X						
AIDS	22		X						
AIREPS	23		X						
CODAR	24		X						
SYNOP	31			X					
SYNOP	32			X					
SHIP	33			X					
SHIP	34			X					
Buoys(Environ)	35			X					
SATEM	41				X				
SARAD	51					X			
SATOB	61						X		
SATOB	62						X		
SATOB	63						X		
BATHY	71							X	
TESAC	72							X	
DRIBU	81								X

3. MODIFICATIONS TO THE DATABASE BY DATA TYPE

In this section, the modifications made to the database by data type for SOP-1 (5 January 1979 through 5 March 1979) and SOP-2 (1 May 1979 through 30 June 1979) are described. Duplicate reports were eliminated from all data types. Fixed reporting stations were checked against a list of stations (provided by P. Kallberg) known to have had at least one occurrence of an incorrect geographical location. Erroneous locations were corrected. In addition, the data were sorted within each file by latitude and longitude.

3.1 Rawinsonde Data

Rawinsonde height and temperature profiles were corrected at levels above 100 mb for the effects of solar radiation. The corrections were computed as a function of pressure level, solar elevation angle, and instrument type (McInturff et al., 1979) with routines provided by G. Costello and J. Laver of NMC. Longwave corrections were applied above 10 mb.

USSR wind reports with windspeeds greater than 100 ms^{-1} were eliminated.

3.2 Pilot Balloon Data

No special treatment was performed.

3.3 TWOS Radar Sounding Data

No special treatment was performed.

3.4 TWOS NAVAID Sounding Data

No special treatment was performed.

3.5 Aircraft Dropwindsonde Data

No special treatment was performed.

3.6 Constant Level Balloon Data

No special treatment was performed.

3.7 Experimental Satellite Stratospheric Sounding Data

No special treatment was performed.

3.8 Aircraft Data - ASDAR

An erroneous Data Source Index was modified to the correct value of 21. ASDAR reports were identified by a trailing "z" in the six character identification. Multiple wind reports with identical latitude, longitude, observation time, and quality marks indicating correct data were eliminated.

3.9 Aircraft Data - AIDS

Reports with a latitude and longitude of 0.0° were eliminated. Multiple wind reports with identical latitude, longitude, observation time, and quality marks indicating correct data were eliminated.

3.10 Aircraft Data - Conventional (AIREP and CODAR)

Multiple wind reports with identical latitude, longitude, observation time, and quality marks indicating correct data were eliminated.

3.11 Manual and Automatic Surface Land Observations

No special treatment was performed.

3.12 Surface Observations from Fixed and Mobile Ships

All ship locations were verified against the Scripps 1° x 1° topography. All reports with locations over land were eliminated.

3.13 Surface Observations from Environmental Buoys

No special treatment was performed.

3.14 Satellite Sounding Data

The following corrections were made to TIROS-N reports as suggested by R. Green of NESS:

ORIGINAL PAGE IS
OF POOR QUALITY

(a) All tropopause parameters were deleted for SOP-1 and 2.

(b) All ozone parameters were deleted during SOP-1 and 2.

(c) All precipitable water parameters were deleted from 5 January through 21 January and from 1 March through 5 March.

(d) All layer mean temperatures above 100 mb were deleted for observations poleward of 74° from 5 January through 11 February and from 1 March through 5 March.

(e) Complete temperature profiles were deleted from 1 May through 5 May, if the observations were between 60° S to 75° S and the MSU channel 4 temperature was less than 219 K.

(f) Complete temperature profiles were deleted from 1 May through 26 May, if the observations were between 55° S to 60° S and the MSU channel 4 temperature was less than 215 K.

TIROS-N microwave retrievals with precipitable water contamination were eliminated following the suggestion of Phillips (1980). Microwave retrievals were not checked at 1200 and 1800 GMT 25 February 1979 because the TIROS-N retrievals and the radiances could not be collocated. Geopotential height thicknesses were generated by a procedure provided by NMC.

No changes were made to the VTPR soundings from NOAA-5.

3.15 Satellite Clear-Radiance Data

Data type was not processed.

3.16 Satellite Cloud-Track Wind Data

The cloud-track wind data file is summarized in Table 2. The Wisconsin reprocessed winds from the Japanese satellite were merged with the satellite wind file.

Table 2. Cloud-track wind identification summary. The tables above each column refer to those in the FGGE data management plan (Staff of the GARP Activities and the Participants in the FGGE Data Management Scheme, 1978). DSI denotes the Data Source Index, IT the Instrument Type, IDPT the Indicator for the Data-Processing Technique, TSWD the Type of Satellite Wind Derivation, and SPCF the Subjective Pressure Confidence Factor.

Producer/Type	Table I DSI	Table II IT	Table XVIII IDPT	Table XXXIII TSWD	Table XXX SPCF
WISC E	61	60 GOES-2 (SOP-1); 66 SMS-1 and 2 (SOP-1 and 2)	2	40-49	3
WISC W	61	61 GOES-3	2	40-49	3
WISC INDIAN OCEAN	61	59 GOES-1	2	40-59	3
WISC REPROC. JAPANESE	61	68 GMS	2	40-59	3
NESS E	61	60 GOES-2	3	30-39	3
NESS E*	61	59 GOES-2 (SOP-1)	3	30-39	3
NESS W	61	61 GOES-3	3	30-39	3
NESS W**	61	59 GOES-3 (SOP-1)	3	30-39	3
EUROPEAN	61	67 METEOSAT	4	10-19	0
JAPANESE	61	68 GMS	3	20-29	3
GERMAN	61	59 GOES-1	2	43 or 48	0
FRENCH	61	59 GOES-1	2	40 or 45	0

* Incorrect Instrument Type assignment; requires longitude verification $> 255°$ E
** Incorrect Instrument Type assignment; requires longitude verification $\leq 255°$ E

The 1800 GMT 16 January Wisconsin winds from GOES West were deleted because some cumulus level winds were assigned to the cirrus level. The Instrument Type for NESS East and West cloud-track winds was incorrectly designated as 59 during part of SOP-1. We re-assigned the NESS cloud-track wind Instrument type to 60 (GOES West) for reports with a longitude > 255° E and to 61 (GOES West) for reports with a longitude $\leq$ 255° E (see Table 2)

3.17 Satellite Cloud-Data

Data type was not processed.

3.18 Satellite Sea Surface Temperature Data

Data type was not processed.

3.19 Oceanographic Data

Data type was not processed.

3.20 Drifting Buoy Data

No special treatment was performed.

3.21 Summary of the Database Modifications during SOP-1 and 2

Table 3 contains the typical corrections and deletions made to the database during SOP-1 and 2, respectively. The number of changes indicated for the upper-air file does not include corrections made for radiation effects on the rawinsonde temperature and heights. The changes indicated for the satellite soundings include only the corrections made for precipitable water contamination and duplicate reports.

Table 3. Modifications made to the FGGE II-b database during SOP-1 from 0000 GMT 12 January to 0000 GMT 19 January by file type.

Data Format / Time	Upper-Air	Arcrft.	Surface	Sat. Snding.	Sat. Clear Rad.	Sat. Wind/ SST	Oceano-graphic	Drift. Buoy
1/12/oz	10	79	27	94	0	532	0	0
6z	3	75	34	93	0	3	0	0
12z	12	83	32	70	0	490	0	0
18z	1	114	34	84	0	492	0	0
1/13/oz	13	76	34	58	0	519	0	0
6z	3	105	37	91	0	0	0	0
12z	11	29	42	49	0	366	0	0
18z	1	53	27	105	0	377	0	0
1/14/oz	11	22	26	92	0	518	0	0
6z	0	80	30	100	0	14	0	0
12z	10	69	35	74	0	418	0	0
18z	0	168	30	111	0	420	0	0
1/15/oz	15	125	34	20	0	493	0	0
6z	0	177	27	105	0	4	0	0
12z	10	57	39	88	0	432	0	0
18z	0	65	24	133	0	373	0	0
1/16/oz	15	55	33	99	0	585	0	0
6z	2	100	36	90	0	2	0	0
12z	10	67	38	85	0	415	0	0
18z	2	144	30	74	0	339	0	0
1/17/oz	11	64	36	21	0	515	0	0
6z	3	85	43	91	0	2	0	0
12z	13	61	43	78	0	425	0	0
18z	1	122	41	92	0	383	0	0
1/18/oz	15	107	32	104	0	368	0	0
6z	4	82	37	95	0	0	0	0
12z	11	59	34	78	0	365	0	0
18z	2	39	42	103	0	337	0	0
1/19/oz	13	112	37	78	0	331	0	0

4. AUTOMATED EDITING PROCEDURES

A FORTRAN program was prepared which implements the modifications to the data described in Section 3. The subsequent sections describe this program as well as the data file structure.

4.1 Program Organization

The program has been developed, tested, and executed on the Amdahl 470/V6 under control of the Conversational Monitor System (CMS). The FORTRAN and assembler code resides in six local files:

- HCARUS L2BDRIVE - Constitutes the driver portion of the program; establishes the proper calling sequence for each specific type of data.
- HCARUS L2BWRITE - Performs the required corrections to each type of data; encodes the edited file and writes to output tape.
- HCARUS L2BREAD - Reads the input tapes and unpacks the reports, one file at a time.
- HCARUS L2BUTIL - Contains auxiliary routines that perform functions such as sorting, primitive encoding, and file copying.
- HCARUS L2BRSTAR - Performs all functions related to restart conditions and issues messages for tape mounts.
- CMS ROUTINES - Performs primitive tape handling functions (i.e. sense switch, read label, unload, error test, and detach).

The first five files reside in the CARUS account and contain FORTRAN code only. The last file resides in the BRBINNG account and contains both FORTRAN and assembler code.

4.2 Permanent Data Sets

The program requires the contents of six data sets of which two are input tapes, one is the output tape, and three are disk files.

4.2.1 Sweden Level II-b Main Data

The format of these tapes is described in Appendix 10 of Staff of the GARP Activities and the Participants in the FGGE Data Management Scheme (1978).

4.2.2 Wisconsin Reprocessed Japanese Cloud-Motion Winds

The format of these tapes is described in Appendix 10 of Staff of the GARP Activities and the Participants in the FGGE Data Management Scheme (1978).

4.2.3 Edited Level II-b Main Data

The format of these tapes is described in Appendix 10 of Staff of the GARP Activities and the Participants in the FGGE Data Management Scheme (1978) with the following exceptions:

- The test file is not included.
- The tape-header file is not included.
- Satellite clear radiance (DSI = 51), sea surface temperature (DSI = 63), and oeanographic data (DSI = 71, 72) are not included.

4.2.4 Scripps Topography

This file contains global terrain height data on a 1° grid prepared at the Scripps Institution of Oceanography as described in Gates and Nelson (1975).

The data reside on MVS disk and are cataloged in CLI.JA.SCRIPS.TOPOG.YR79.

4.2.5 Coordinate Corrections

This file contains the correct coordinates (provided by P. Kallberg) for a subset of stations that are known to have had at least one occurence

of an incorrect geographical location. The data reside on CMS disk under the name LEVEL2B CORRECTN.

4.2.6 Restart File

The restart file contains the counts for processed files on the two input tapes and the output tape. It resides on MVS disk and is cataloged under GWS.CARUS.LEVEL2B.RESTART.DATA.

4.2.7 Namelist File

This file contains a namelist definition for the number of tapes and their volume-serial numbers. It resides on MVS and is cataloged under GWS.CARUS.LEVEL2B.NAMELIST.DATA.

4.3 Program Execution

Execution is accomplished by invoking the L2BT2 EXEC residing in the CARUS account. The program requires 3.5 megabytes of memory and six temporary data sets.

4.4 Flow Diagram of the Program Logic

The following seven diagrams (Fig. 1a-1g) illustrate the flow of the program logic.

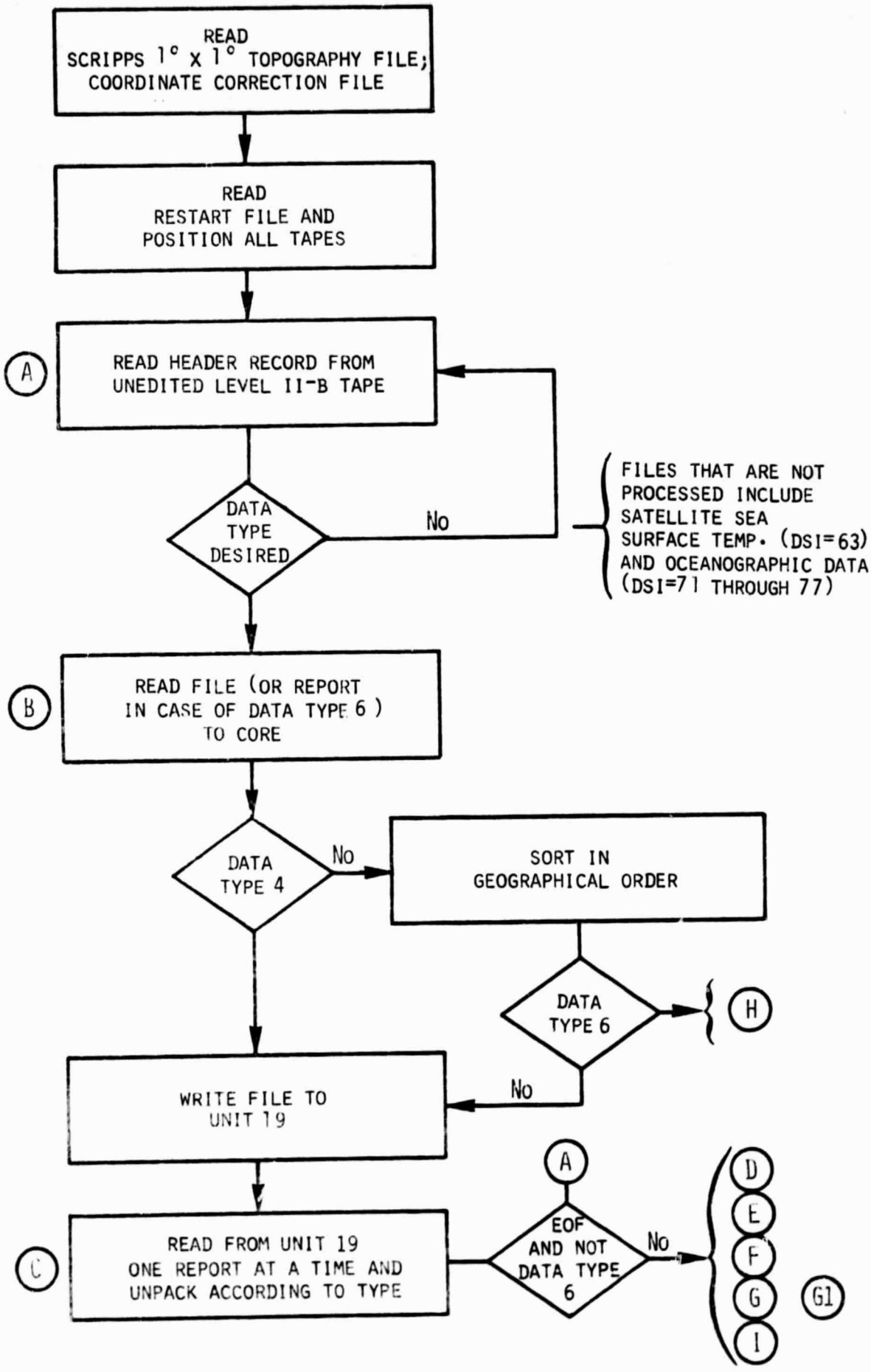

Fig. 1a. Flow diagram of the program logic.

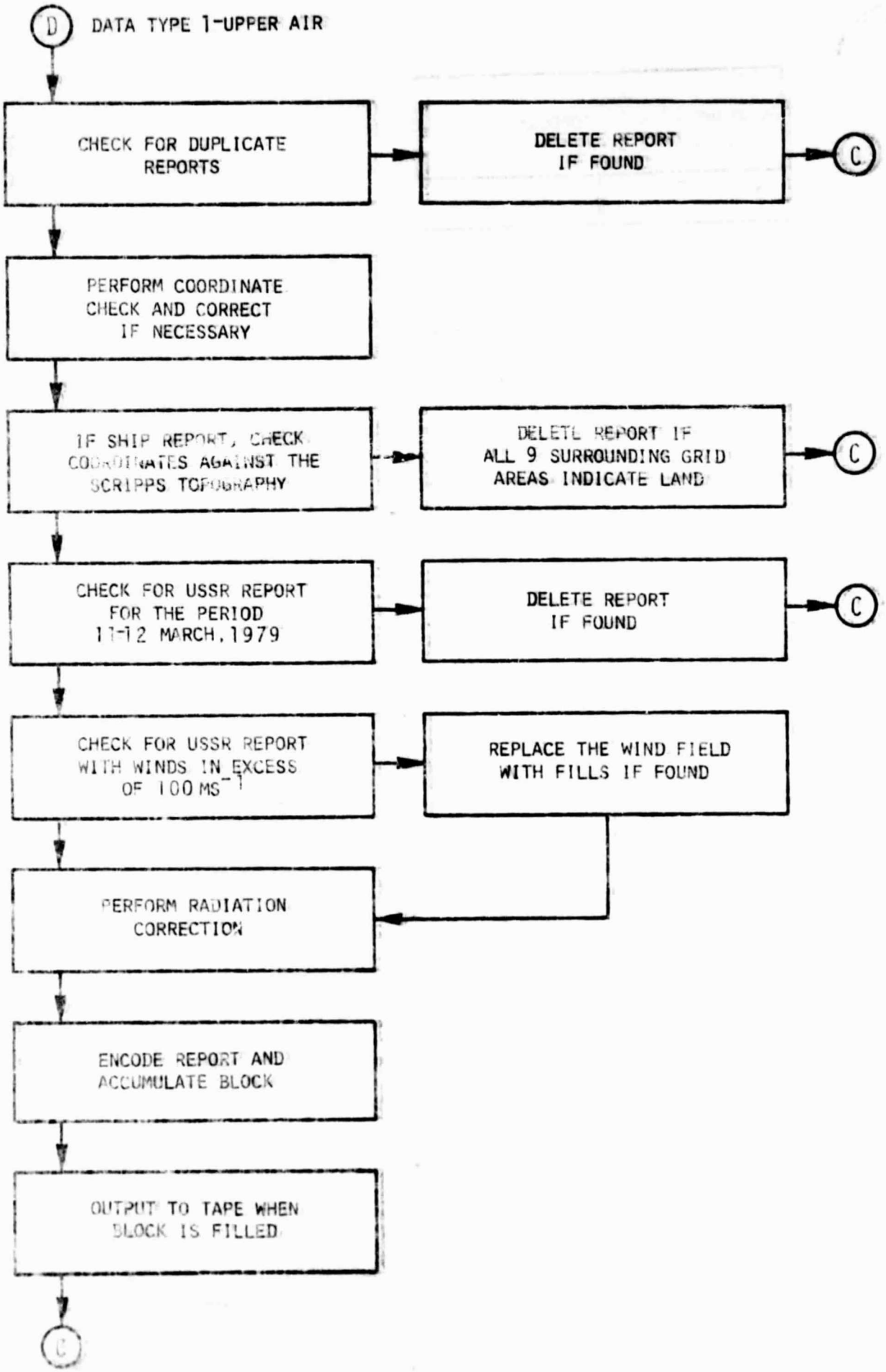
D
DATA TYPE 1-UPPER AIR
CHECK FOR DUPLICATE REPORTS
DELETE REPORT IF FOUND
C
PERFORM COORDINATE CHECK AND CORRECT IF NECESSARY
IF SHIP REPORT, CHECK COORDINATES AGAINST THE SCRIPPS TOPOGRAPHY
DELETE REPORT IF ALL 9 SURROUNDING GRID AREAS INDICATE LAND
C
CHECK FOR USSR REPORT FOR THE PERIOD 11-12 MARCH, 1979
DELETE REPORT IF FOUND
C
CHECK FOR USSR REPORT WITH WINDS IN EXCESS OF 100 MS-1
REPLACE THE WIND FIELD WITH FILLS IF FOUND
PERFORM RADIATION CORRECTION
ENCODE REPORT AND ACCUMULATE BLOCK
OUTPUT TO TAPE WHEN BLOCK IS FILLED
C

Fig. 1b.

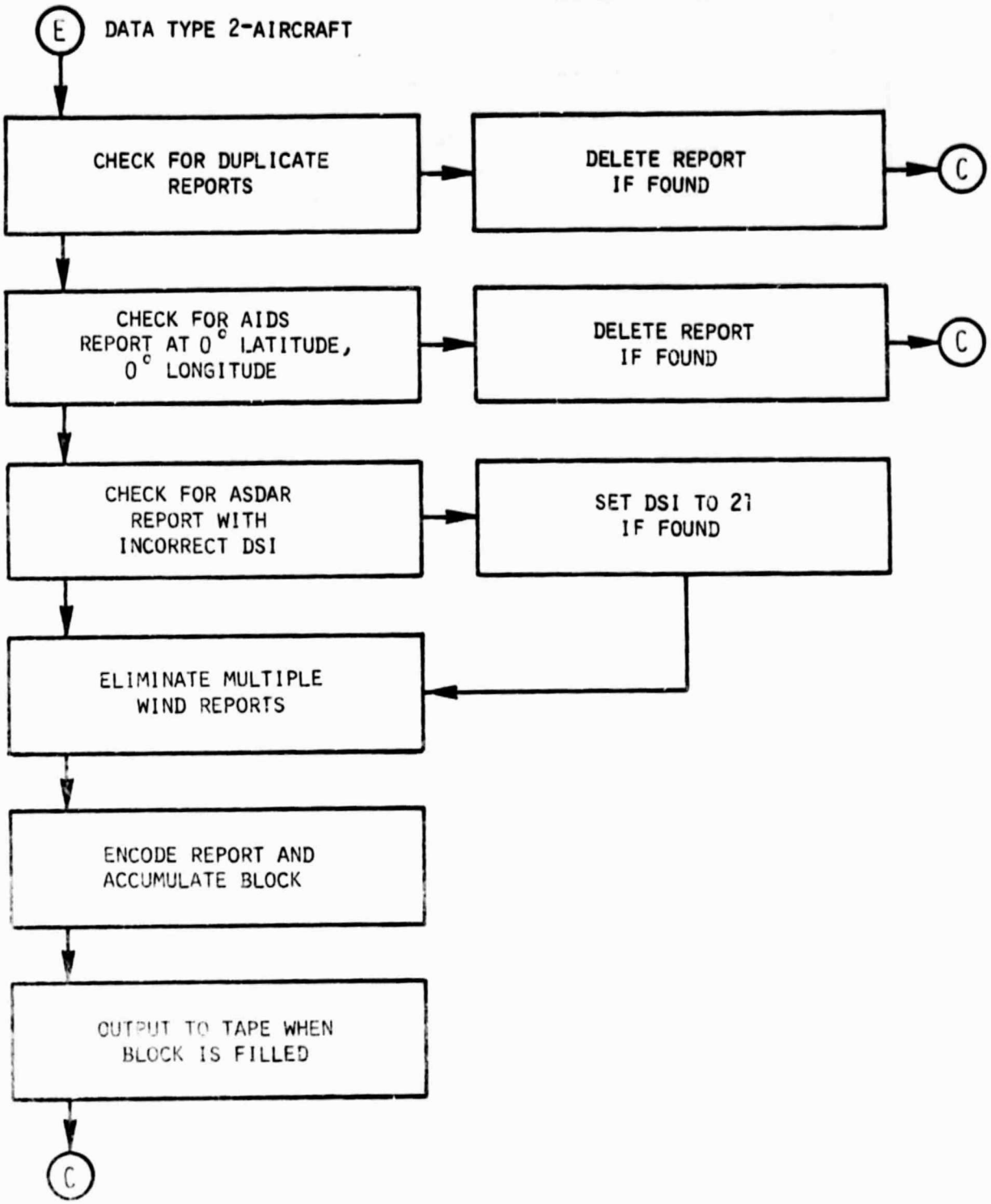
E
DATA TYPE 2-AIRCRAFT
CHECK FOR DUPLICATE REPORTS
DELETE REPORT IF FOUND
C
CHECK FOR AIDS REPORT AT 0° LATITUDE, 0° LONGITUDE
DELETE REPORT IF FOUND
C
CHECK FOR ASDAR REPORT WITH INCORRECT DSI
SET DSI TO 21 IF FOUND
ELIMINATE MULTIPLE WIND REPORTS
ENCODE REPORT AND ACCUMULATE BLOCK
OUTPUT TO TAPE WHEN BLOCK IS FILLED
C

Fig. 1c.

ORIGINAL PAGE IS
OF POOR QUALITY

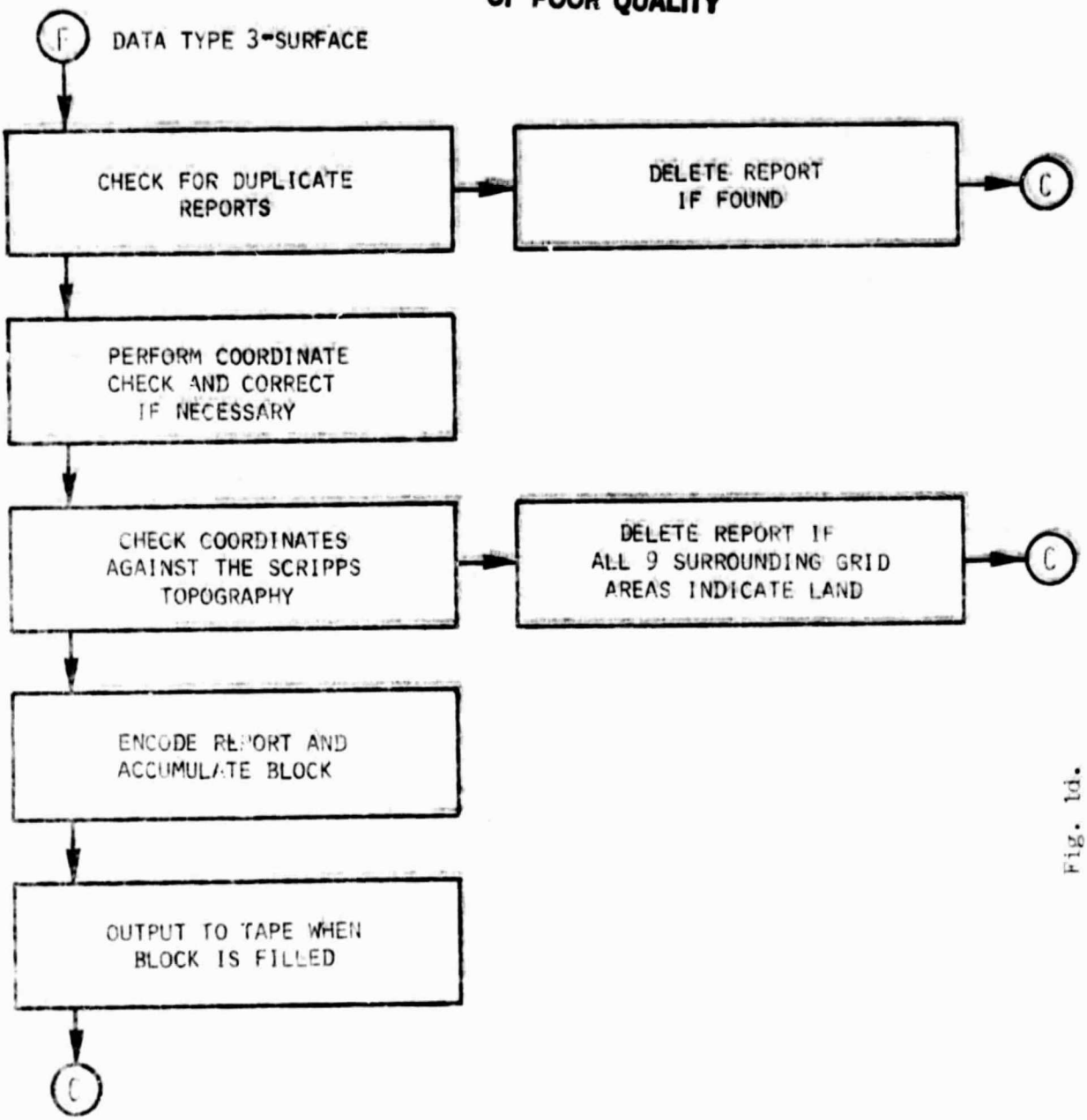

Fig. 1d.

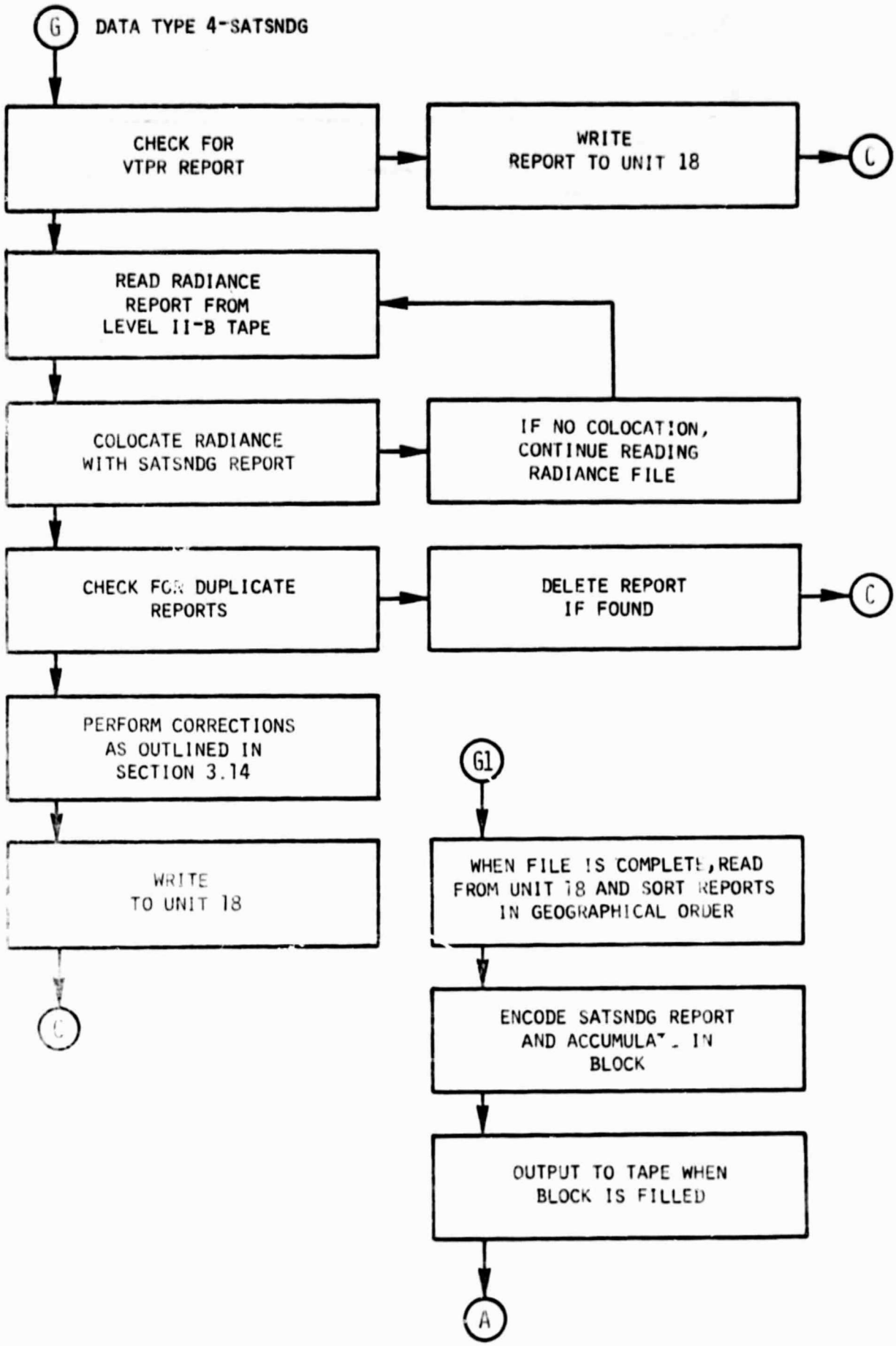
G
DATA TYPE 4-SATSNDG
CHECK FOR VTPR REPORT
WRITE REPORT TO UNIT 18
C
READ RADIANCE REPORT FROM LEVEL II-B TAPE
COLOCATE RADIANCE WITH SATSNDG REPORT
IF NO COLOCATION, CONTINUE READING RADIANCE FILE
CHECK FOR DUPLICATE REPORTS
DELETE REPORT IF FOUND
C
PERFORM CORRECTIONS AS OUTLINED IN SECTION 3.14
WRITE TO UNIT 18
C
G1
WHEN FILE IS COMPLETE, READ FROM UNIT 18 AND SORT REPORTS IN GEOGRAPHICAL ORDER
ENCODE SATSNDG REPORT AND ACCUMULATE IN BLOCK
OUTPUT TO TAPE WHEN BLOCK IS FILLED
A

Fig. 1e.

ORIGINAL PAGE IS
OF POOR QUALITY

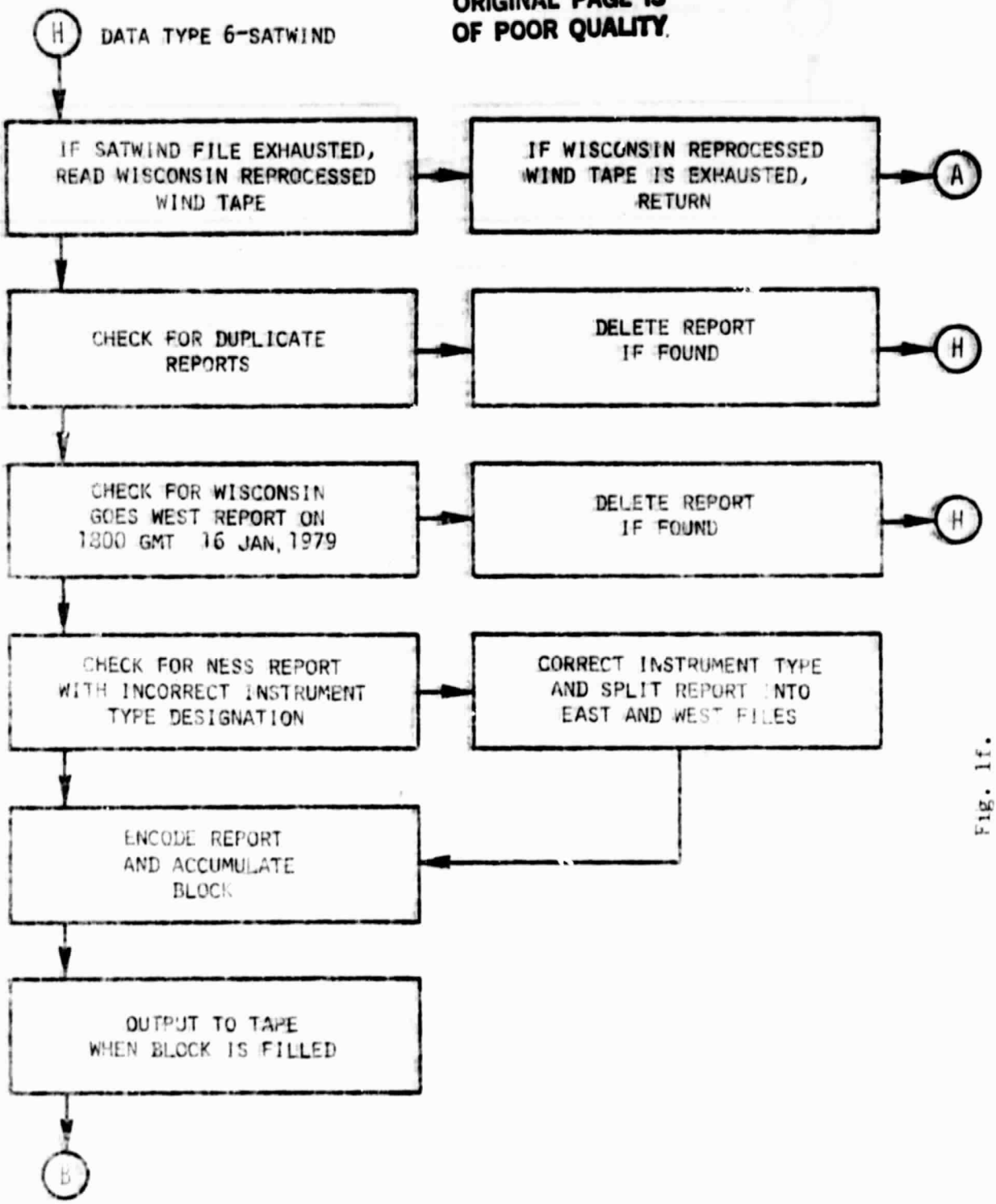

Fig. 1f.

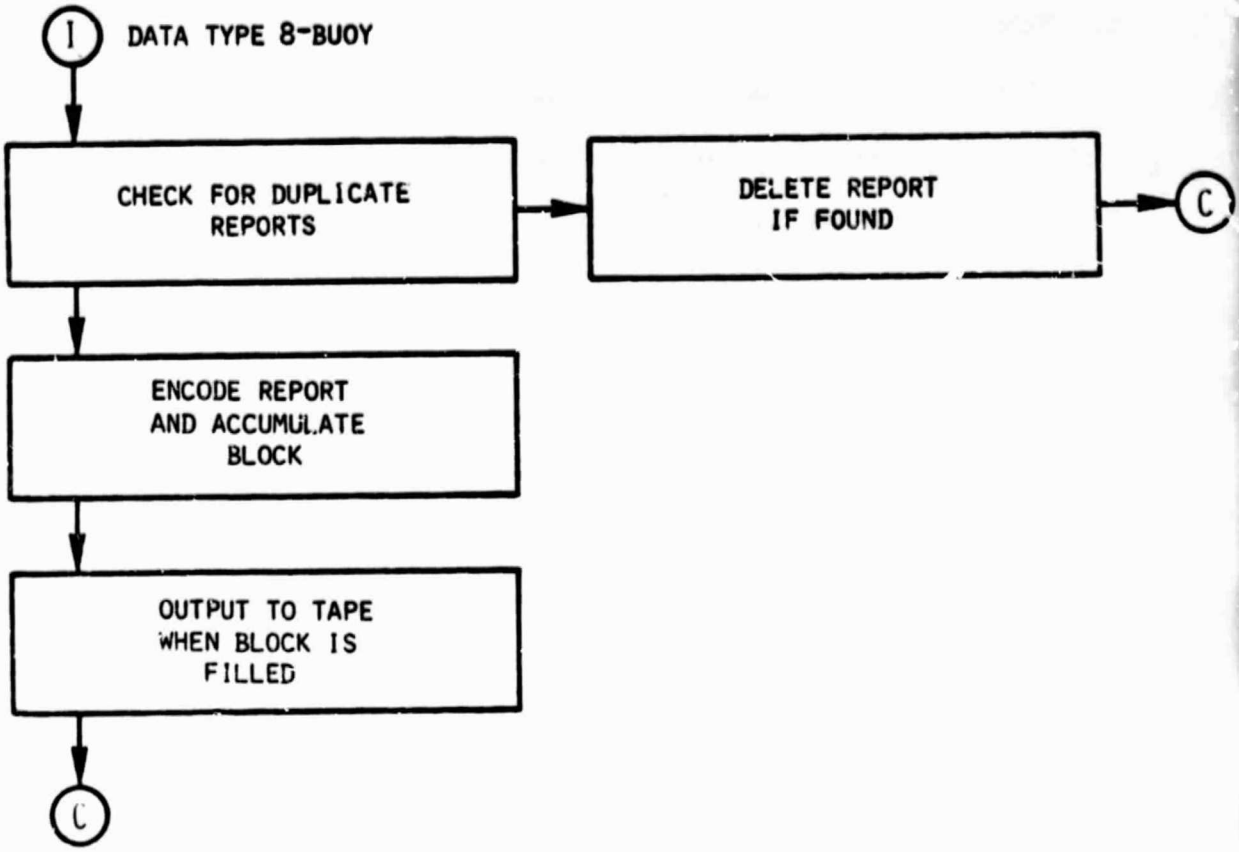
I
DATA TYPE 8-BUOY
CHECK FOR DUPLICATE REPORTS
DELETE REPORT IF FOUND
C
ENCODE REPORT AND ACCUMULATE BLOCK
OUTPUT TO TAPE WHEN BLOCK IS FILLED
C

Fig. 1g.

ORIGINAL PAGE IS
OF POOR QUALITY

5. SUMMARY

The objective procedures developed for editing the FGGE Level II-b data have been described. The edited database is probably the most accurate one available thus far for FGGE SOP-1 and 2. Most of the modifications described in this report will be performed on the Final Level II-b database now in preparation in Sweden and scheduled to be delivered to the World Data Centers in 1983 (S. Orrhagen, personal communication). Other data sets such as TIROS-N retrievals from the FGGE Special Effort will also be included in the Final database. The editing procedures will be modified to accommodate the additional data sets.

REFERENCES

Gates, W. L., and A. B. Nelson, 1975: A new (revised) tabulation of the Scripps topography on a 1° global grid - Part 1: Terrain heights. Tech. Report R-1276-1-ARPA, 132 pp.

McInturff, R. M., F. G. Finger, K. W., Johnson, and J. D. Laver, 1979: Day - night differences in radiosonde observations of the stratosphere and troposphere. NOAA Tech. Memo. NWS NMC, 63, 47 pp.

Phillips, N. A., 1980: Two examples of satellite temperature retrievals in the North Pacific. Bull. Amer. Meteor. Soc., 61, 712-717.

Staff of the GARP Activities Office and the Participants in the FGGE Data Management Scheme, 1978: Implementation/operations plan for the First GARP Global Experiment. The Data Management Plan, 3.