

# Systems Cost/Performance Analysis (Study 2.3) Final Report

## Volume III: Programmer's Manual and User's Guide

Prepared by

ADVANCED MISSION ANALYSIS DIRECTORATE  
Advanced Orbital Systems Division

*DRA*

27 September 1974



Prepared for

OFFICE OF MANNED SPACE FLIGHT  
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION  
Washington, D.C. 20546

Contract No. NASW-2575



Systems Engineering Operations

THE AEROSPACE CORPORATION

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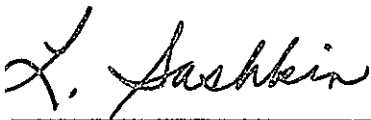
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## FOREWORD

This report documents The Aerospace Corporation effort on Study 2.3, Systems Cost/Performance Analysis, performed under NASA Contract NASW-2575 during Fiscal Year 1974. The effort was directed by Mr. B. H. Campbell. Mr. R. D. Kramer, Marshall Space Flight Center and Mr. R. R. Carley, NASA Headquarters were the NASA Study Directors for this study. Their efforts in providing technical direction throughout the duration of the study are greatly appreciated.

This volume is one of three volumes of the final report for Study 2.3. The three volumes are:

Volume I	Executive Summary
Volume II	Systems Cost/Performance Model
Appendix	Data Base
Volume III	Programmer's Manual and User's Guide

Volume I summarizes the overall report. It includes the relationship of this study to other NASA efforts, significant results, study limitations, and suggested additional effort.

Volume II provides a detailed description of the Systems Cost/Performance Model. It also includes the model checkout and the results for three payload test cases. The Data Base is provided in the Appendix to Volume II.

Volume III provides a detailed description of how the Systems Cost/Performance Computer Program is organized and operates. The program listing, detailed flow charts and user restrictions are included.

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The Aerospace Corporation effort on Study 2.3 was supported by various Members of the Technical Staff (MTS). The contributions of the following MTS to the System Cost/Performance Computer Program are gratefully acknowledged:

R. M. Harris  
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H. S. Porjes  
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## 1. INTRODUCTION

One of the objectives for FY 1974 Study 2.3 was to implement the Systems Cost/Performance Model as a digital computer program. The program would be used to perform initial program planning, cost/performance tradeoffs, and sensitivity analyses.

Contained herein is a discussion of the operating environment in which the program was written and checked; the program specifications such as discussions of logic and computational flow; the different subsystem models involved in the design of the spacecraft; and routines involved in the nondesign area such as costing and scheduling of the design. Preliminary results for the DSCS-II design are also included.

Section 2 of this volume covers the Operating Environment. This includes both hardware and software considerations for the IBM 370/155

Section 3 contains the Program Specifications. These include the computational flow, a discussion of the MACRO-MICRO concept, a detailed discussion of the COMMON structures used for communication the model, and the Hardware Selection procedure.

Section 4 covers the subroutines that select hardware from the data base. These include Stabilization and Control (Subroutine SANDC), Auxiliary Propulsion (Subroutine AP), Data Processing and Instrumentation (Subroutine DPI), Communications (Subroutine COMM), and Electrical Power (Subroutine EP). A discussion of the communication within with the main program is included along with the default parameters set in the DATA statements.

Section 5 covers the subroutines that do not select equipment but do size or calculate information that is pertinent to the design. Subroutines included are: FILTER, which filters out incompatible designs; INITIL, which initializes certain default numbers that are needed early in



the model but are not computed until later in the model; READDB, which reads the data base for any one subsystem at a time; SAVE, which saves certain matrices to be used by later subroutines; VESIZE, the vehicle sizing routine that computes weights, lengths, and inertias for the design; STRUCT, that computes the data needed to size the structure; RELY, which computes the reliability for the spacecraft; THRML, which computes the thermal requirements for the spacecraft; COSTS, which calculates the various costs involved in building and integrating the entire spacecraft system; SKED, which computes the schedule for the spacecraft from initial design phase to the launch phase; and PRNT, which outputs the final design attributes.

Section 6 contains a discussion of the data base format and tape requirements. Also discussed is the PRESORT routine which allows one to presort the data base into a different order based on cost, weight, reliability, etc.

Section 7 summarizes the restrictions and limitations established within the program.

Section 8 contains a discussion of the actual sample case used to check the program. Also included is the input section including all default values and changes pertaining to the sample case. The results of the test case are discussed here also.

Sections 9 and 10 contain the source code listing and the detailed flow charts, respectively.

## 2. OPERATING ENVIRONMENT

Section 2 contains a description of the operating environment within which the program was coded and checked. Paragraph 2.1 summarizes the hardware involved and Paragraph 2.2 summarizes the software involved.

### 2.1 HARDWARE

#### 2.1.1 Computer

IBM 370 - 155

#### 2.1.2 Main Memory Utilization

270K Bytes - to compile

162K Bytes - to link edit

108K Bytes - to execute

#### 2.1.3 Magnetic Tapes

Required only for presort (see Paragraph 6.2)

#### 2.1.4 Card Punch

Not required

#### 2.1.5 Plotter

Not required

#### 2.1.6 Disk

Unit 1 - requires about five tracks on an IBM 3330 (cataloged space)

NOTE: A tape may be substituted.

### 2.2 SOFTWARE

#### 2.2.1 Operating System

HASP-OS Release 21.7

2.2.2 Programming Language

FORTRAN

2.2.3 Type of Run

BATCH

2.2.4 Library Subroutines

SQRT

SIN

COS

TAN

ATAN

ARSIN

EXP

FLOAT

INT

ALOG

### 3. PROGRAM SPECIFICATIONS

Paragraph 3.1 contains a description of the over-all program flow and a discussion of the MACRO-MICRO concept. Paragraph 3.2 contains a discussion of the common structures. Paragraph 3.3 contains a discussion of the hardware selection procedure. Detailed discussions of all subroutines can be found in Sections 4 and 5.

#### 3.1 COMPUTATIONAL FLOW CHART

In general, it can be said that the program has an outer loop on configurations and an inner loop on iterations. The inner loop on iterations includes the calling of all subsystem subroutines and for ITER = 0 the calling of the reliability subroutine. For ITER = 1 (second pass) reliability is bypassed. The structures, thermal, cost, and print subroutines are called once per outer loop on configurations. A general flowchart is shown in Figure 3-1.

#### 3.1.1 MACRO-MICRO

A prerequisite to the understanding of the MACRO-MICRO concept is an understanding of "configuration". A set of rules for selecting equipments is associated with each subsystem. Which set of rules is to be used at any moment in time is determined by NCONF (configuration number) for that subsystem. For example, if NCONF(1) = 5, a star sensor will be selected by reference to the appropriate equations. However, if NCONF(1) = 1, a star sensor will never be selected. Thus, the configuration numbers determine a subset of the sets of equipments, and only this subset is considered for the configuration design.

A MACRO search is a method for testing all possible combinations of configuration numbers (one per subsystem) and determining within this subset of equipments and within the subset of selection procedures the first acceptable equipments for each. Some combinations of configurations

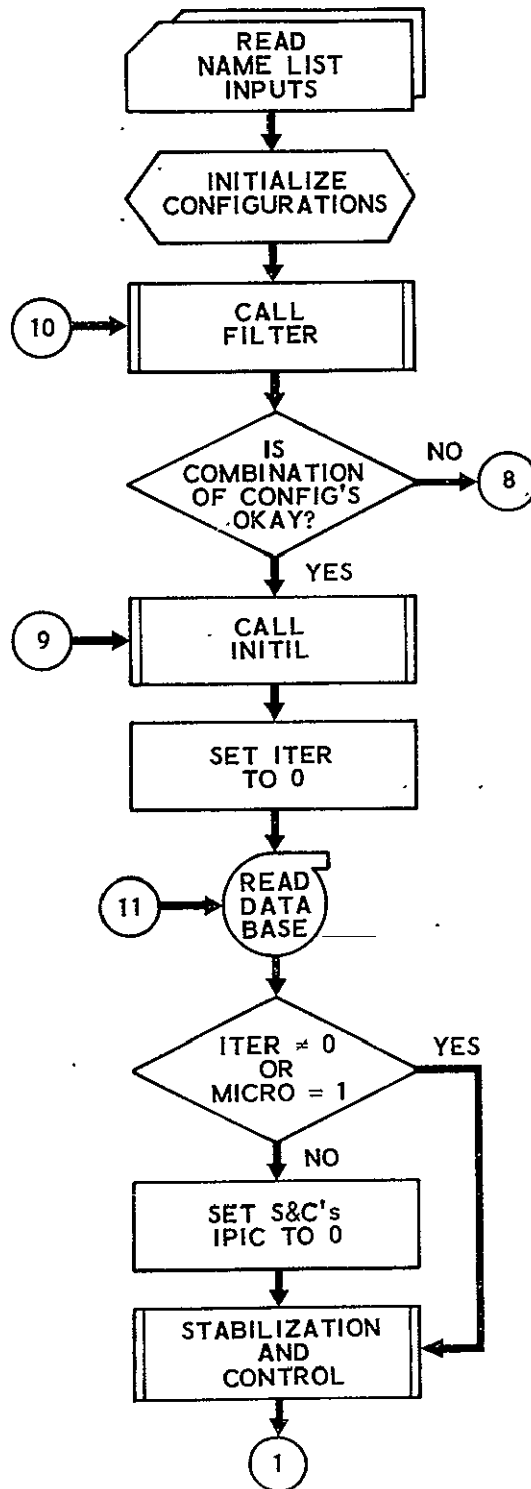


Figure 3-1. Hardware Selection Procedure in Kth Subsystem

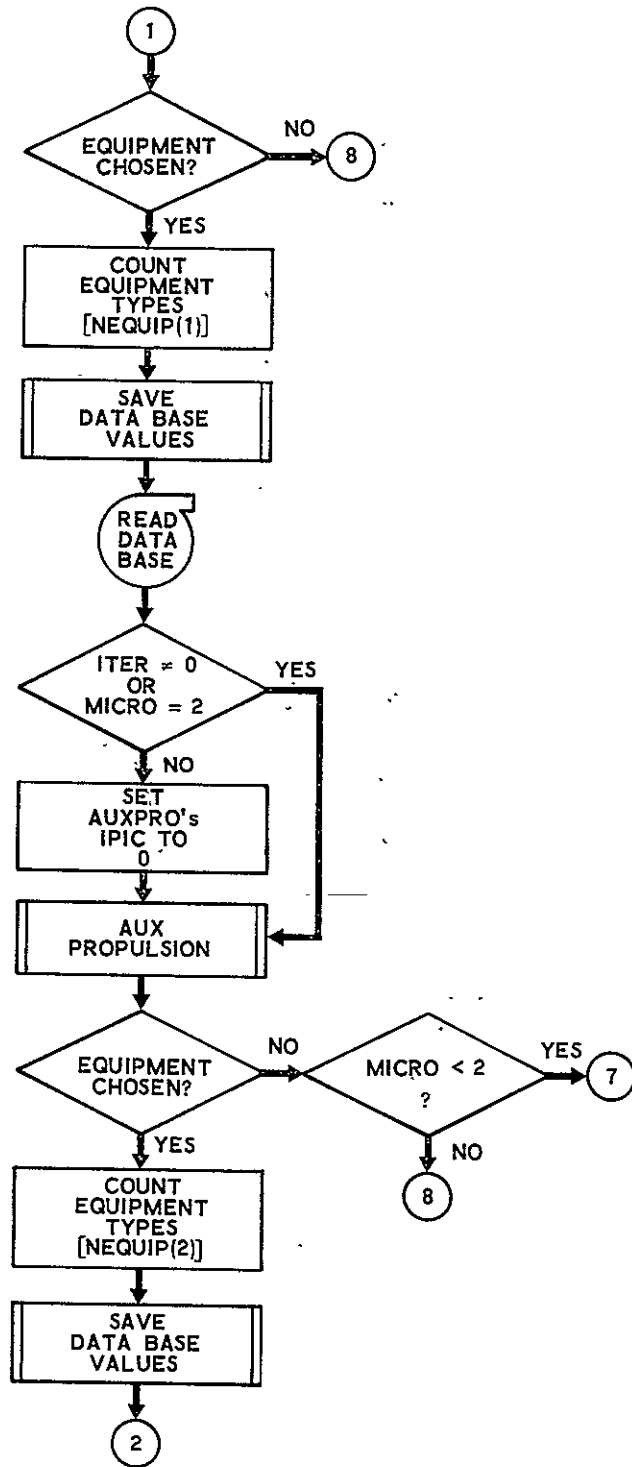


Figure 3-1. Hardware Selection Procedure in Kth Subsystem (Continued)

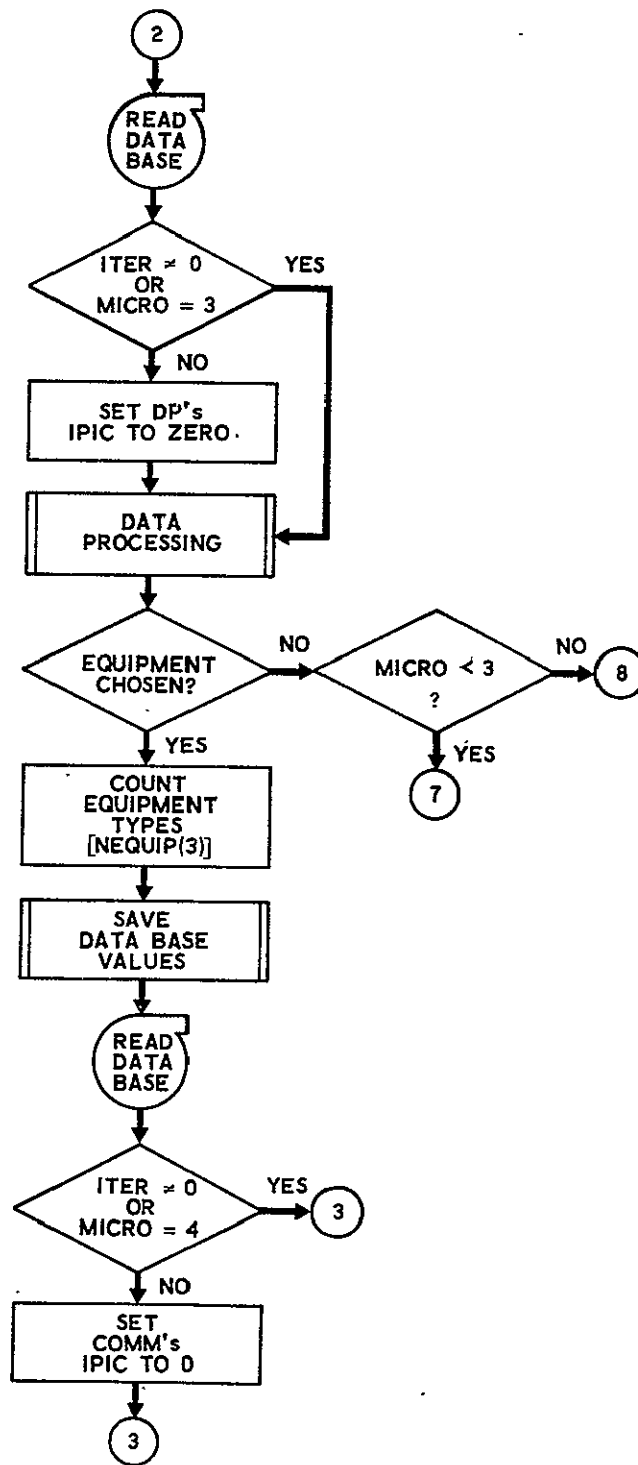


Figure 3-1. Hardware Selection Procedure in Kth Subsystem (Continued)

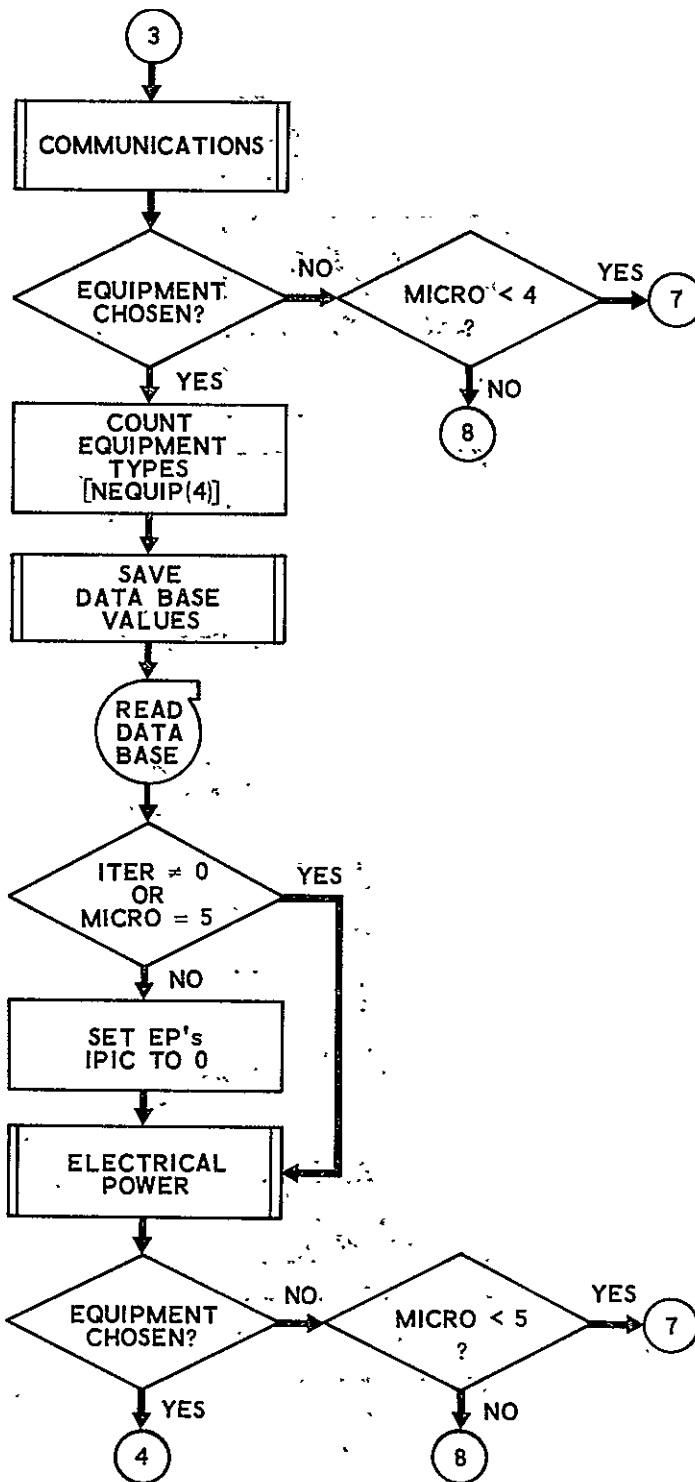


Figure 3-1. Hardware Selection Procedure in Kth Subsystem (Continued)



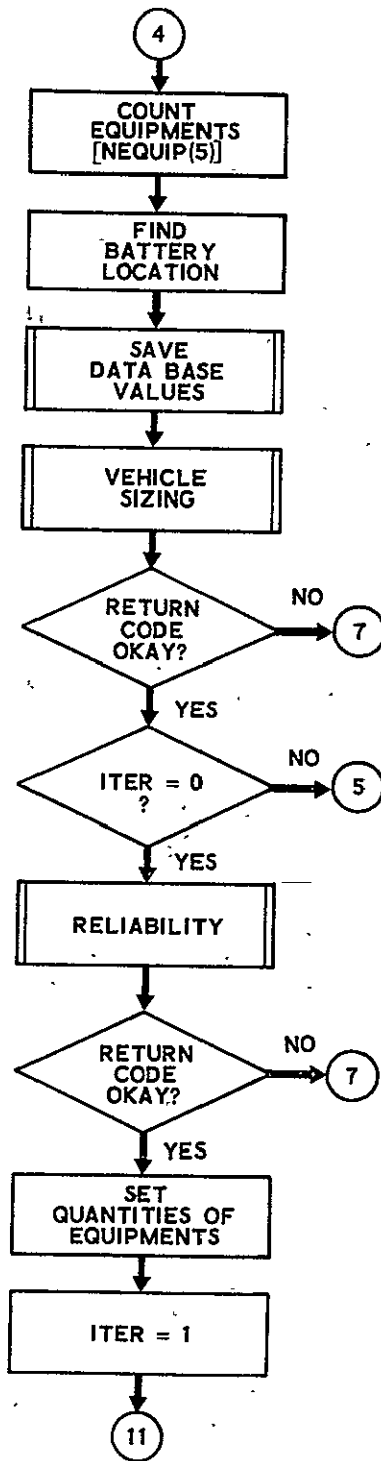


Figure 3-1. Hardware Selection Procedure in Kth Subsystem (Continued)

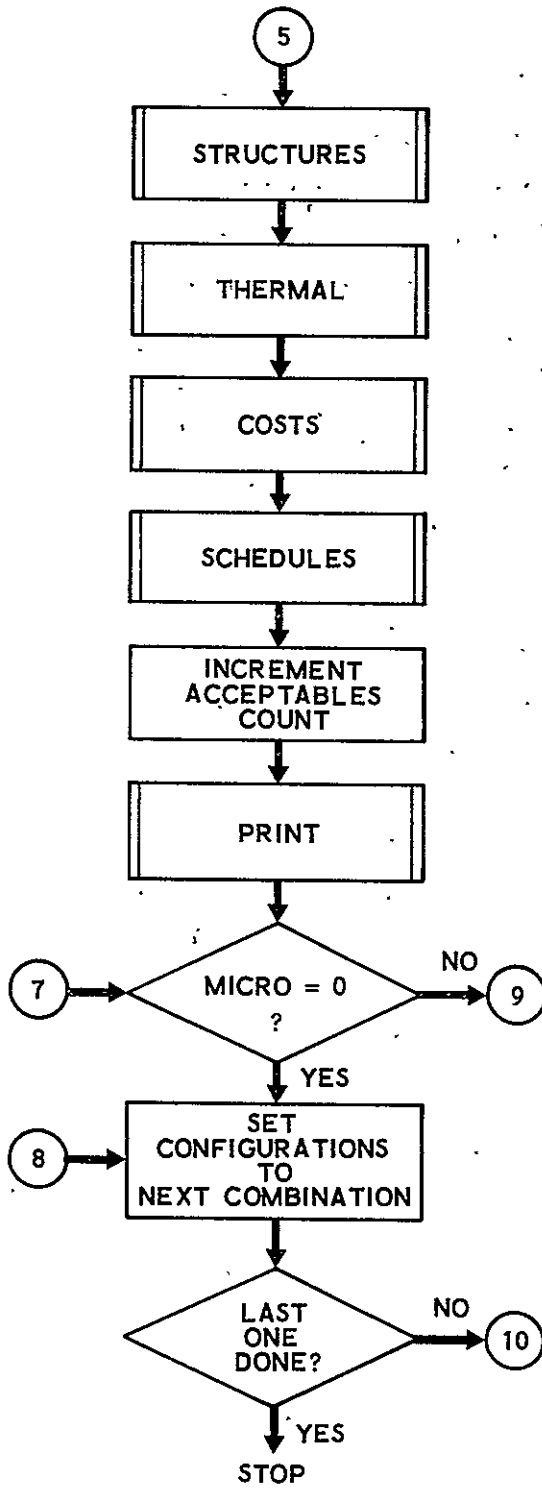


Figure 3-1. Hardware Selection Procedure in Kth Subsystem (Continued)

are never acceptable, and some are ruled out by mission requirements; but a MACRO search will, in general, produce many acceptable designs.

In a MICRO mode all configuration numbers except the one being "MICROed" are fixed. Care must be taken that these numbers are compatible. For example, VESIZE should not be set to configuration 2 when SANDC is set at 2; that is, a box shape for the equipment bay is incompatible with dual spin. Within the subsystem being "MICROed", all configurations are checked and all possible combinations of equipments within the subset determined by configuration are checked. Within a configuration then, it is essentially the stopping point which determines the difference between a MACRO and a MICRO. A MACRO selects the first acceptable equipment in each category. The MICRO selects all combinations of acceptable equipments.

### 3.2 COMMON REGIONS

The main COMMON regions consist of user COMMONs, DBCOM, BTWN, CHOSE, and PRTCOM.

The various user COMMONs (USER-1, USER-2, USER-3, etc.) are for storage of user specified values. These values are preset to default values by a block data routine but are overwritten by values specified in the namelist form by the user. For a complete description of the contents of the namelist variables in each user's COMMON see Paragraph 8.1. The COMMON and NAMELIST names with corresponding variables are as follows:

<u>Named COMMON Block Name</u>	<u>NAMELIST Name</u>	<u>Subsystem</u>
USER-1	USRSC	Stabilization and control
USER-2	USRAP	Auxiliary propulsion
USER-3	USRDP	Data processing and instrumentation
USER-4	USRCM	Communications
USER-5	USREP	Electrical power
USER-6	USRVS	Vehicle sizing
USER-7	USRTH	Thermal

<u>Named COMMON Block Name</u>	<u>NAMELIST Name</u>	<u>Subsystem</u>
USER-8	USRSK	Schedules
USER-9	USRST	Structures
USER-I	MODE	General
USER-R	USRRE	Reliability
USER-C	USRCS	Cost

DBCOM acts as storage for blocks of the data base. All data base values for one of the hardware selection subroutines (i.e., all 55 attributes associated with all equipments relevant to that subsystem) are read at one time. These values are stored in matrix DATAB(55, 90). In addition, the COMMON contains IDB(30) (see Paragraph 3.3) which is filled by the read routine. IDB(I) contains the last column number for the Ith equipment of the active subsystem.

The named COMMON block CHOSE contains values pertaining to equipment already chosen. ICHOSE(60) and NCHOSE(60) are concatenations of the separate ICHOSE(I) and NCHOSE(I) of each subsystem which selects hardware as discussed in Paragraph 3.3. COST(5, 60) is a matrix formed by selecting the following rows from the data base for each equipment selected:

<u>Matrix</u>	<u>Row of DATAB</u>	<u>Description</u>
COST (1, I)	46	Design engineering cost
COST (2, I)	47	Test and evaluation cost
COST (3, I)	48	Unit production cost
COST (4, I)	49	Reference quantity
COST (5, I)	50	Factor

SKD(7; 60) is a matrix formed by selecting the following rows from the data base for each equipment selected:

<u>Matrix</u>	<u>Row of DATAB</u>	<u>Description</u>
SKD (1, I)	46	Design engineering cost
SKD (2, I)	47	Test and evaluation cost
SKD (3, I)	51	Development constant
SKD (4, I)	52	Development variable
SKD (5, I)	53	Qualification constant
SKD (6, I)	54	Qualification variable
SKD (7, I)	55	State-of-the-art factor

REL(6, 60) is a matrix formed by selecting the following rows from the data base for each equipment selected:

<u>Matrix</u>	<u>Row of DATAB</u>	<u>Description</u>
REL (1, I)	23	Weight
REL (2, I)	41	Failure model
REL (3, I)	42	$\lambda$ or $\mu$
REL (4, I)	43	$\sigma$
REL (5, I)	44	q
REL (6, I)	45	Maximum redundancy

THM(4, 60) is a matrix formed by selecting the following rows from the data base for each equipment selected:

<u>Matrix</u>	<u>Row of DATAB</u>	<u>Description</u>
THM (1, I)	17	Maximum power
THM (2, I)	18	Minimum power
THM (3, I)	27	Maximum temperature
THM (4, I)	28	Minimum temperature

DPIA(11, 60) is a matrix formed by selecting the following rows from the data base for each equipment selected:

<u>Matrix</u>	<u>Row of DATA B</u>	<u>Description</u>
DPIA (1, I)	30	Number power commands
DPIA (2, I)	31	Number other commands
DPIA (3, I)	32	Number time tags
DPIA (4, I)	33	Number high rate analog points
DPIA (5, I)	34	Number high rate digital points
DPIA (6, I)	35	High sample rate
DPIA (7, I)	36	Word length
DPIA (8, I)	37	Number low rate analog points
DPIA (9, I)	38	Number low rate digital points
DPIA (10, I)	39	Low sample rate
DPIA (11, I)	40	Word length

These matrices are needed by the subroutines that have similar names. For example, COST is used by COSTS, REL is used by RELY, SKD is used by SKED, THM is used by THRML, and DPIA is used by DPI

PRTCOM is used to pass values to the print subroutine which are not needed (except for output) outside of a given routine. A description of the variables in this COMMON block is given below:

<u>Name</u>	<u>From</u>	<u>Units</u>	<u>Description</u>
ACCRCY	SANDC	deg	S&C accuracy
CISTAR	EP	amp-hr	Battery capacity
IREL	RELY	---	0 means single string 1 means dual string
MMDOLD	RELY	mo	Mean mission duration
TRUNC	RELY	mo	Reliability truncation time
ITRUNC	RELY	---	Index for reliability
DE	COST	\$	Design engineering cost
TE	COST	\$	Test and evaluation cost
TOOLR	COST	\$	DDT&E tooling and test equipment cost
QCR	COST	\$	DDT&E quality control cost

<u>Name</u>	<u>From</u>	<u>Units</u>	<u>Description</u>
SEIR	COST	\$	DDT&E systems engineering and integration cost
PMR	COST	\$	DDT&E program management cost
PE	COST	\$	Unit engineering cost
PU	COST	\$	Unit production cost
TOOLU	COST	\$	Investment tooling and test equipment cost
QCP	COST	\$	Investment quality control cost
SEIP	COST	\$	Investment systems engineering and integration cost
PMP	COST	\$	Investment program management cost
SATR	COST	\$	DDT&E spacecraft cost
SATINV	COST	\$	Spacecraft investment cost
MER	COST	\$	DDT&E mission equipment cost
MEINV	COST	\$	Mission equipment investment cost
PAYR	COST	\$	DDT&E total payload cost
PAYINV	COST	\$	Total payload investment cost
PAYQUL	COST	\$	DDT&E qual. units cost
GSE	COST	\$	DDT&E GSE
XLTOT	COST	\$	Launch support operations cost
CTOT	COST	\$	Flight operations cost
FEER	COST	\$	DDT&E contractor fee
FEEINV	COST	\$	Investment contractor fee
DDTE	COST	\$	DDT&E program total
XVEST	COST	\$	Investment program total
OPS	COST	\$	Operations program total
SKTAU(1)	SKED	mo	Design and component development time
SKTAU(2)	SKED	mo	Component qualification time

<u>Name</u>	<u>From</u>	<u>Units</u>	<u>Description</u>
SKTAU(3)	SKED	mo	Subsystem development time
SKTAU(4)	SKED	mo	Subsystem qualification time
SKTAU(5)	SKED	mo	Subsystem development and flight readiness time
ROLD(60)	RELY	---	Reliability of each module
TTT	STRUCT	in.	Skin thickness
AN	STRUCT	---	Number of stringers
TS	STRUCT	in.	Stringer thickness
BS	STRUCT	in.	Stringer height
AM	STRUCT	---	Number of frames
TF	STRUCT	in.	Frame thickness
BF	STRUCT	in.	Frame height
TC	STRUCT	in.	End cover thickness forward
TA	STRUCT	in.	End cover thickness center
TB	STRUCT	in.	End cover thickness aft
TOTOPS	DPI	ips	Computer operations rate

Communication of all design variables between subsystems is accomplished via COMMON block BTWN. A description of all variables contained in BTWN is given below:

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Units</u>	<u>Description</u>
WT	ALL	VS	lb	Accumulated equipment wt
VOL	ALL	VS	ft <sup>3</sup>	Accumulated volume
DT	INITIL, VS	SANDC	ft	Dist. from c. g. to engine
D	INITIL, VS	SANDC	ft	Vehicle diameter
DX	INITIL, VS	SANDC	ft	Gas jet lever arm (roll, pitch, and yaw)
DY	INITIL, VS	SANDC	ft	
DZ	INITIL, VS	SANDC	ft	
XJ	INITIL, VS	SANDC	slug-ft <sup>2</sup>	Vehicle inertia (roll, pitch, yaw)
YJ	INITIL, VS	SANDC	slug-ft <sup>2</sup>	
ZJ	INITIL, VS	SANDC	slug-ft <sup>2</sup>	



<u>Name</u>	<u>From</u>	<u>To</u>	<u>Units</u>	<u>Description</u>
RJ	INITIL, VS	SANDC	slug-ft <sup>2</sup>	Rotor spin axis inertia
FF	SANDC	AUXPRO	lb	Attitude and control thrust
TI	SANDC	AUXPRO	lb-sec	Total impulse
PL	ALL	EP	watts	Average power
PLMIN	ALL	EP	watts	Minimum power
LMBDD	EP	RELY		Depth of discharge of battery capacity
AREA	EP	VS	ft <sup>2</sup>	Solar array area
SATLG	VS	THERMAL	ft	Vehicle length
WATE	EP	VS, RELY	lb	Solar array weight
NC	EP	RELY		Number of cells
ACSWP	AUXPRO	VS	lb	Propellant weight
HARNWT	VS	COSTS	lb	Harness weight (wiring)
THCMWT	VS	COSTS	lb	Thermal control weight
CONVWT	SANDC & COMM	COSTS	lb	Converters weight
TNKWT	AUXPRO	COSTS	lb	Propellant feed systems weight
PASSTR	VS	COSTS	lb	Equivalent structures weight
SATTWT	VS	PRINT	lb	Vehicle weight.
TPRIM	REL	SANDC	mo	Mission length
IBTLOC	EP	THERMAL		Battery location (column No.)
RADA	THERMAL	PRINT	ft <sup>2</sup>	Radiator area
RADAB	THERMAL	PRINT	ft <sup>2</sup>	Battery radiator area
RAT	THERMAL	PRINT	ft <sup>2</sup>	Total radiator area
HTRPWR	THERMAL	PRINT	Btu/hr	Heater power
HTRPRB	THERMAL	PRINT	Btu/hr	Battery heater power
HPT	THERMAL	PRINT	Btu/hr	Total heater power
HTPIPE	THERMAL	PRINT	Btu/hr	Heat pipe
VCHP	THERMAL	PRINT	Btu/hr	Variable conductance heat pipe
HTPT	THERMAL	PRINT	Btu/hr	Total heat pipe

<u>Name</u>	<u>From</u>	<u>To</u>	<u>Units</u>	<u>Description</u>
FC	SANDC	REL	hr <sup>-1</sup>	APS thruster cycle rate
XNZERO	EP	RELY	rad/sec	Orbital mean motion
COMRT	COMM	DPI	ips	Command rate
ACSSN	SANDC	REL		Number of sensors
BITRAT	DPI	COMM	bps	Bit rate (mission equipment and housekeeping)

### 3.3 HARDWARE SELECTION PROCEDURE

This section describes the hardware selection procedure, the method of communication between the MAIN program and the hardware selection subroutines, and the general procedure used in systematically checking all hardware parameters until a component is found that meets the specifications. Discussions as to which hardware is selected can be found in the appropriate subsystem subroutine sections (see Section 4). There are five subroutines in which hardware is selected: SANDC (Stabilization and Control), AUXPRO (Auxiliary Propulsion), DPI (Data Processing and Instrumentation), COMM (Communications), and EP (Electrical Power). The procedures described in Table 3-1 and Figures 3-2 through 3-4 are applicable to all of these subroutines.

Table 3-1. Hardware Selection Procedure in Kth Subsystem

Calling Sequence

SUBROUTINE SSK (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

Definition of Variable Names

- |    |                 |   |  |
|----|-----------------|---|--|
| 1. | IPIC(NSIZE).    | = | hardware index indicating data base column<br><br>NSIZE = maximum number of equipments sized for any configuration   |
| 2. | IERR.           | = | message flag<br>0 means no message<br>1 means first message only<br>10 means second message only<br><br>.<br>.<br>.<br>111 means first, second and third messages are applicable |
| 3. | ITER            | = | iteration flag (0 means first time through)  |
| 4. | NCONF(6)        | = | system configuration indices   |
| 5. | ICHOSE(NEQUIP)* | = | I. D. of hardware chosen<br><br>NEQUIP = maximum equipments (in general, more than one manufacturer per equipment) in any configuration  |
| 6. | NCHOSE(NEQUIP)  | = | number of identical pieces of hardware required  |

Additional Variables Used in Selection Procedure

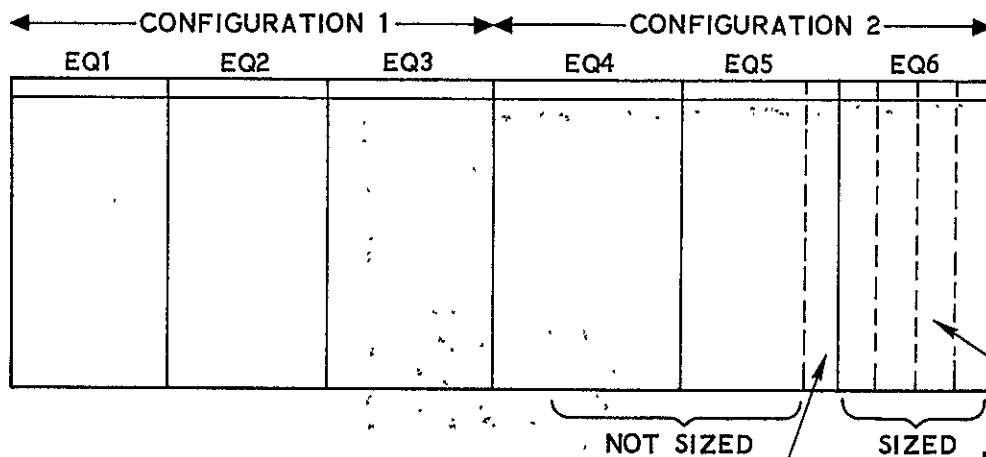
- |    |               |   |   |
|----|---------------|---|---|
| 7. | DATAB(NR, NC) | = | data base for subsystem<br><br>NR = total equipment attributes<br>NC = total number of individual pieces of hardware                        |
| 8. | IDB(NTOTL)*   | = | last hardware column index for all equipment<br><br>NTOTL = total number of equipments in data base for this subsystem (all configurations) |

Assumptions in Example Routine Described Below

1. Two equipments require sizing in the first configuration.

\* See Figure 3-2 for further explanation

FIRST ROW CONTAINS  
HARDWARE I. D.



IDB(5)  
(Last manufacturer,  
5th equipment in  
subsystem data base)

IF THIS PIECE OF HARDWARE IS  
ACCEPTABLE,

ICHOSE (3) = DATAB(1, J1) =  
4 digit I. D.

3RD EQUIPMENT, 2ND CONFIGURATION  
WHERE,

$J1 = IDB(5) + 3$

Figure 3-2. Explanation of Arrays: IDB and ICHOSE

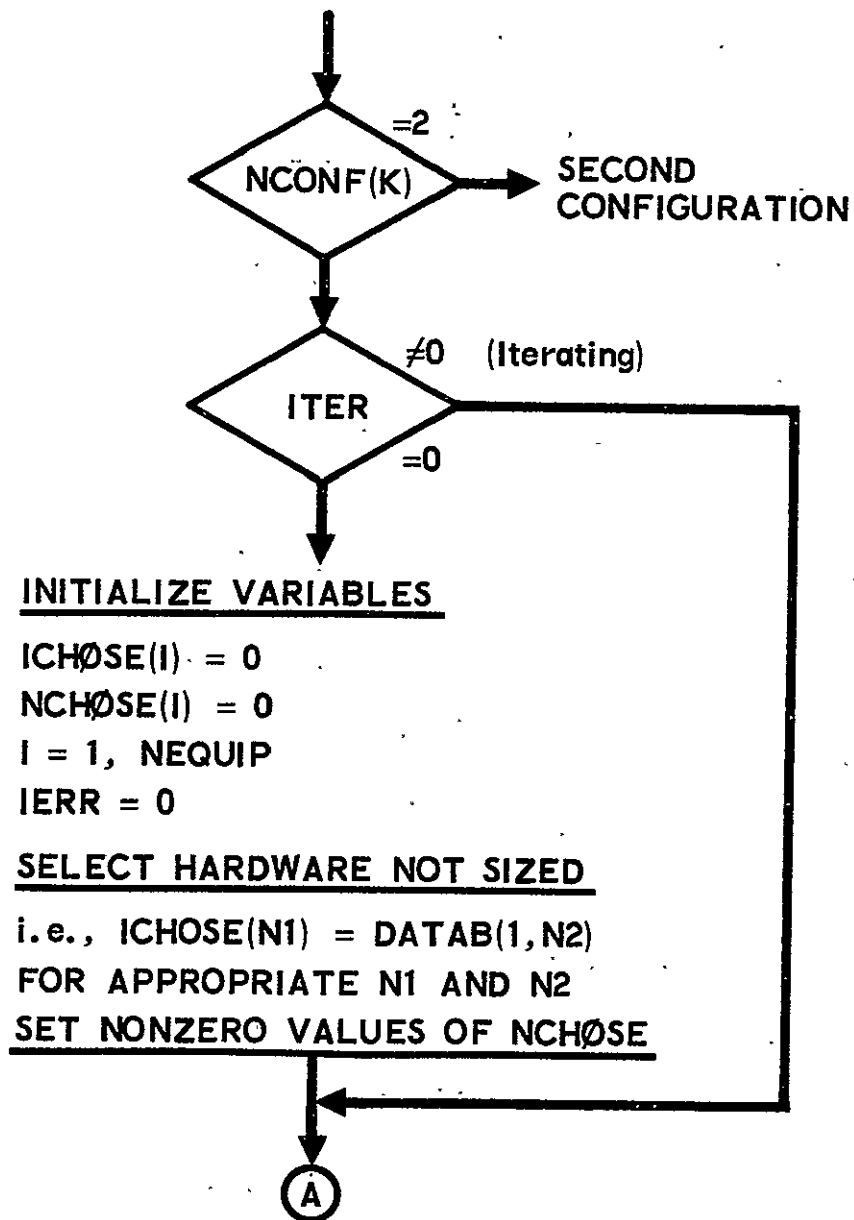


Figure 3-3. Hardware Selection Flow Chart

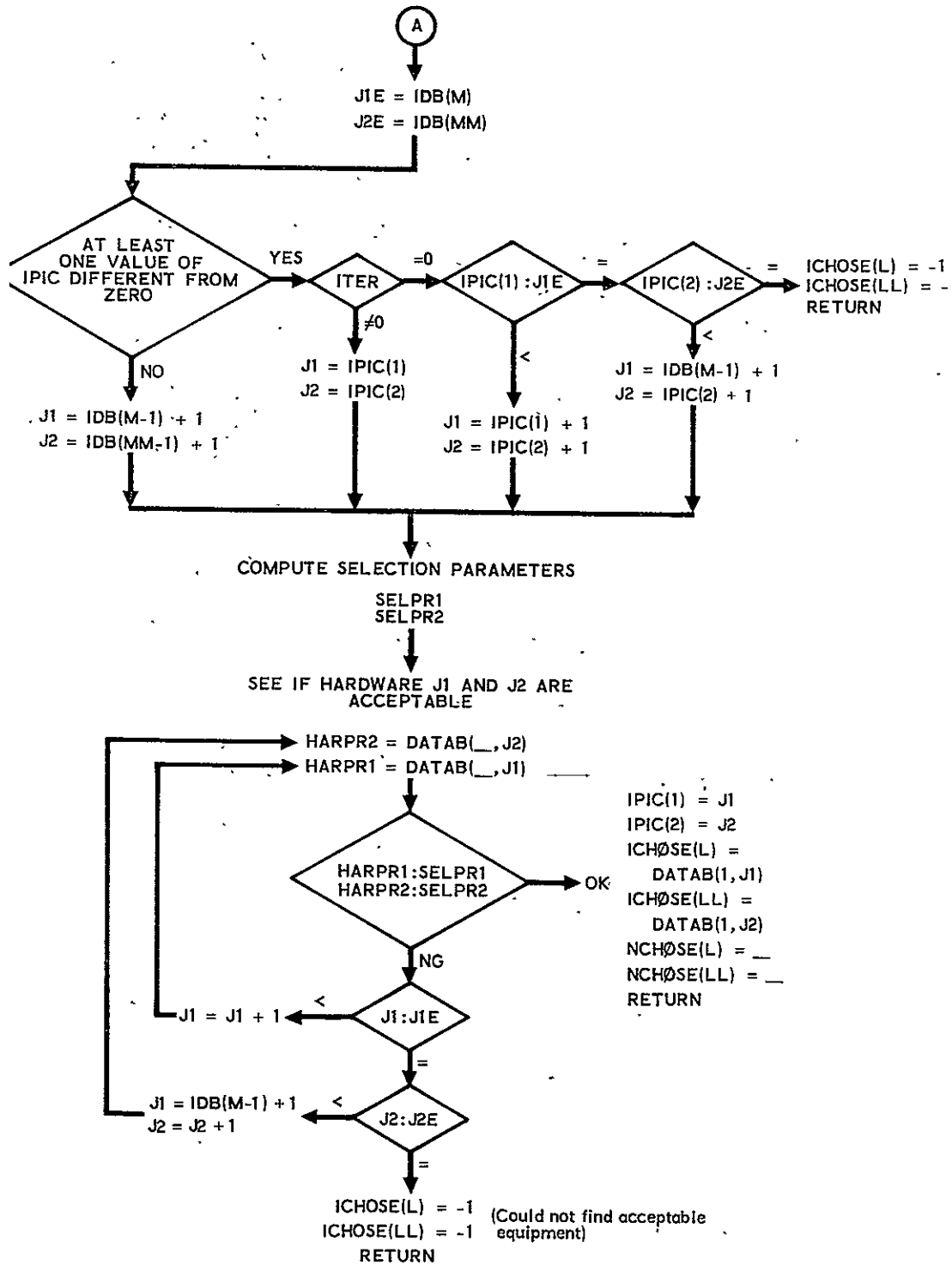


Figure 3-4. Main Program Logic

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#### 4. SUBROUTINES WHICH SELECT HARDWARE

##### 4.1 SUBROUTINE SANDC (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

##### 4.1.1 Purpose of Subroutine

The Stabilization and Control Subsystem stabilizes a spacecraft to a desired accuracy about a tracking line from a reference on the vehicle to an external reference. The external reference may be the local vertical of a planet, the sun, or a more distant star; an inertial reference; or the line of sight to a natural phenomenon like a gravity gradient or the lines of the earth's magnetic field. In many cases, a platform free to rotate with respect to the main structure of the vehicle must also be aligned with an external reference. The necessary accuracy of attitude stabilization depends, of course, on the mission of the vehicle.

The principal calculations, other than those necessary to select stabilization and control equipment, are contained in equations for thrust and total impulse. These are necessary for the correct sizing of equipment in auxiliary propulsion.

Those equipments which are selected on the basis of data base values, rather than merely by equipment type, vary widely from configuration to configuration. Sensor selection is based on factors such as dead-band and pointing errors (with respect to various axes). The equations for sensor selection tend to be quite complicated and involve user input, numbers from other subsystems, and values from the data base for many of the selected equipments. As an example, star sensors are selected on the basis of type (mappers or trackers), rate error, pointing error, sensitivity, and compatibility with the selected gyro and control moment gyros (CMGs). CMGs are selected on the basis of momentum, gimbals rate, and torque. Reaction (or momentum) wheels are selected on the basis of the angular momentum required.



The five configurations and their equipments are as follows:

a. Dual Spin

1. Despin mechanical and electrical assembly
2. Valve driver assembly
3. Sun sensor
4. Nutation damper
5. Gimbal electronics
6. Control timing assembly
7. Gimbal drive assembly
8. Nonscanning earth sensor
9. Power converter

b. Yaw Spin

1. Sun sensor
2. ACS electronics
3. Rate gyro
4. Horizon sensor
5. Reaction wheel
6. Power converter
7. Valve driver

c. Three-Axis Mass Expulsion

1. Attitude reference electronics
2. Valve driver
3. Power converter
4. Rate integrating gyro
5. Scanning earth sensor

d. Momentum Exchange

1. Electronics processor
2. Valve driver
3. Horizon sensor or sun sensor
4. Control moment gyros
5. Rate integrating gyros
6. Star sensor

e. Pitch Momentum Bias

1. Valve driver
2. Electronic error processor
3. Horizon sensor
4. Momentum wheel

#### 4.1.2 Communication with Main Program

The variables in the calling sequence are discussed in Paragraph 3.3.

User inputs are communicated by the COMMON areas USER-1 and USER-I. These are discussed in Paragraph 8.1 (see NAMELISTs USRSC and USRI). Variables are passed to and received from other subroutines through the COMMON area BTWN, which is discussed in Paragraph 3.2. The fourth COMMON area in this subroutine is DBCOM, which contains all necessary data base values and an indexing scheme to reference the values. DBCOM is also discussed in Paragraph 3.2.

#### 4.1.3 Variables Specified in DATA Statements

Seven variables appear in DATA statements. Six of these (XMD, YMD, ZMD, XMD2, YMD2, and ZMD2) are approximations for external torques (ft-lb). The other, DI, is a minimum gas jet on-time in seconds.

#### 4.1.4 Other Subroutines Called

None

#### 4.2 SUBROUTINE AUXPRO (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

##### 4.2.1 Purpose of Subroutine

The auxiliary propulsion subroutine selects hardware which is required to provide attitude control forces and stationkeeping or maneuvering forces. Three configurations are considered in the subroutine. These configurations are characterized by the nature of the propellant under investigation: cold gas, monopropellant, bipropellant.

All thrusters, isolation valves, filters, regulators, and tanks are selected by comparing appropriate attributes listed in the data base with satellite performance requirements determined by the model. Thrusters are selected on the basis of thrust level, isolation valves on the basis of effective flow area, filters on the basis of flow impedance, regulators on the basis of effective flow area and pressure operating range, and tanks on the basis of volume and pressure.

The model does not include selection criteria for the fill and vent valves, fill and drain valves, or the relief valves. The first valves in the appropriate equipment slots in the data base are simply called up.

The sequence in which equipments are selected in each configuration are given below:

- a. Cold Gas [NCONF(2) = 1]
  1. Attitude and control thrusters
  2. Translational thrusters
  3. Pneumatic isolation valves
  4. Pneumatic filters
  5. Pneumatic regulator
  6. Pneumatic tank
  7. Fill and vent valve
  8. Relief valve
- b. Monopropellant [NCONF(2) = 2]
  1. Attitude and control thrusters
  2. Translational thrusters
  3. Fuel circuit isolation valves
  4. Fuel circuit filters
  5. Pneumatic regulator
  6. Pneumatic isolation valve
  7. Fuel tank
  8. Pneumatic tank
  9. Fill and drain valve
  10. Fill and vent valve
  11. Relief valve
- c. Bipropellant [NCONF(2) = 3]
  1. Attitude and control thrusters
  2. Translational thrusters
  3. Fuel circuit isolation valves
  4. Oxidizer circuit isolation valves
  5. Fuel circuit filters
  6. Oxidizer circuit filters
  7. Pneumatic regulator
  8. Pneumatic isolation valve
  9. Fuel tank
  10. Oxidizer tank
  11. Pneumatic tank
  12. Fill and vent valve
  13. Fill and drain valves
  14. Relief valve

Plumbing and connector weight in each configuration is estimated from the combined tank weight.

#### 4.2.2 Communication with Main Program

The variables listed in the calling sequence are common to all subroutines which select hardware and are discussed in Paragraph 3.3.

In addition to the calling sequence, subroutine AUXPRO communicates with the main program via three COMMON blocks: USER-2, BTWN, and DBCOM. Variables coming through USER-2 are user inputs discussed in Paragraph 8.1 (see NAMELISTs USRAP and USRSC). The variables in BTWN and DBCOM are discussed in Paragraph 3.2.

#### 4.2.3 Variables Specified in DATA Statements

DATA XMR/1.5/

XMR = mixing ratio for bipropellant configuration

#### 4.2.4 Other Subroutines Called

None

#### 4.3 SUBROUTINE DPI (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE, NOWAT)

##### 4.3.1 Purpose of Subroutine

The data processing and instrumentation subroutine selects hardware which is required for mission equipment data processing, command decoding, and monitoring purposes. Two configurations are considered in the subroutine: general purpose processing and special purpose processing. In the general purpose mode, a computer on board the satellite performs all data processing tasks unless there is a requirement for separate processing of telemetry data. In this case, a separate digital telemetry unit (DTU) is used to process the housekeeping data. In the special purpose mode, all processing is performed by DTUs. If the communications configuration involves uplink plus downlink, unified link-common antenna, or unified

link-separate antennas, a single DTU performs all mission equipment and housekeeping data processing. If the communications configuration involves unified link-common antenna plus downlink, or unified link-separate antennas plus downlink, one DTU is used for mission equipment data processing and one DTU is used for housekeeping data processing.

The general purpose computer is selected on the basis of total required instructions (or operations) per second. The DTUs are not sized. The first DTUs in the appropriate equipment slot in the data base are simply called up.

The following quantities are computed in the sequence indicated:

- a. Requirement for a digital multiplexer
- b. Number of mainframe words
- c. Word length
- d. Bit rate
- e. Number of words per subframe
- f. Number of subframes

The above quantities are computed regardless of the configuration in sub-routine DPI. Depending on the configuration, the following operations are performed in the sequence indicated:

- a. General Purpose Processing
  1. If telemetry data is processed separately, select one DTU. Otherwise, compute telemetry operations per second.
  2. Compute attitude control, command, and total operations per second.
  3. Select general purpose computer.
- b. Special Purpose Processing
  1. Depending on the communications configuration (as discussed previously), a DTU may or may not be selected for mission equipment data processing.
  2. Select DTU for housekeeping data processing.

#### 4.3.2 Communication with Main Program

The variables listed in the calling sequence with the exception of NOWAT, are common to all subroutines which select hardware and are discussed in Paragraph 3.3. NOWAT is one greater than the number of entries in the ARRAY table. (see DPIA Matrix in Paragraph 3.2).

In addition to the calling sequence, subroutine DPI communicates with the main program via five COMMON blocks: CHOSE, DPITAB, BTWN, DBCOM, and USER-3. Variables coming through USER-3 are user inputs described in Paragraph 8.1 (see NAMELIST USRDP). The variables in BTWN, CHOSE, and DBCOM are discussed in Paragraph 3.2. The variables in DPITAB are listed below:

HRST	=	Sample rate - high ( $\text{sec}^{-1}$ )
TLPTH	=	Number of analog and digital points - high rate
GRANH	=	Word length - high rate (bits)
XSRT	=	Sample rate - low ( $\text{sec}^{-1}$ )
TLPTL	=	Number of analog and digital points - low rate
GRANL	=	Word length - low rate (bits)

#### 4.3.3 Variables Specified in DATA Statements

DATA ACSRT, ACSOP, COMOP, OPREQ/10., 50., 6., 4./

where:

ACSRT	=	ACS rate ( $\text{sec}^{-1}$ )
ACSOP	=	ACS operations
COMOP	=	Command operations.
OPREQ	=	TLM operations required

#### 4.3.4 Other Subroutines Called

##### 4.3.4.1 Subroutine MIS (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

The purpose of this subroutine is to select a DTU for mission equipment data processing. It is called from subroutine DPI in the special purpose processing configuration for the specific communication configurations discussed in Paragraph 4.3.1. The same six quantities (i.e.,

requirement for digital multiplexer, number of mainframe words, word length, bit rate, number of words per subframe, and number of subframes) which are computed in subroutine DPI for all equipment on board the satellite are computed for the mission equipment in subroutine MIS.

The variables listed in the calling sequence are discussed in Paragraph 3.3.

#### 4.3.4.2 Subroutine ORDER (N, A, B, C, XM2, MEDIAN)

The purpose of this subroutine is to order array A from the highest to the lowest entry and determine the median entry in this array. The high rate telemetry points are ordered with respect to both sample rate and word length while the low rate telemetry points are ordered only with respect to sample rate. This information is used to determine mainframe sample rate and maximum word length.

This subroutine is called by both subroutines DPI and MIS. The variables in the calling sequence are defined as follows:

N	=	Number of entries in telemetry points table
A	=	One-dimensional array consisting of sample rates or word lengths
B	=	One-dimensional array consisting of number of analog and digital points
C	=	One-dimensional array consisting of sample rates or word lengths
XM2	=	Twice the median value of array A after it has been ordered
MEDIAN	=	Median entry in array A

#### 4.4 SUBROUTINE COMM (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

##### 4.4.1 Purpose of Subroutine

The communication subroutine selects hardware for the satellite command and telemetry system. Five configurations are provided for in the subroutine. These are determined by the complexity of the data processor

being used and the amount of data to be transmitted. The pieces of equipment which may be selected are: baseband assembly unit, transmitter antenna(s), transmitter(s), receiver antenna, receiver, diplexer, and signal conditioner. The pieces chosen and the number chosen are configuration dependent.

Each piece of equipment to be chosen is selected by comparing the attributes as computed from the user input, configuration number, and default parameter values, with the attributes for that piece of equipment in the data base.

There are pieces of equipment which have constraints placed on them for the selection process. For example, a given baseband assembly unit may be constrained for use with a given transmitter and no other. These constraints are built into the data base.

For the present, the antennas in the data base are limited to one of each type and the steerable parabolic antenna option is to be included in a later version.

The sequences in which equipment are selected in each configuration are given below:

- a. Uplink Plus Downlink [NCONF(4) = 1]
  1. Transmitter antenna
  2. Transmitter
  3. Receiver antenna
  4. Receiver
  5. Signal conditioner
- b. Unified Link, Common Antenna [NCONF(4) = 2]
  1. Baseband assembly unit
  2. Antenna
  3. Transmitter
  4. Receiver
  5. Signal conditioner
  6. Diplexer
- c. Unified Link, Separate Antennas [NCONF(4) = 3]
  1. Baseband assembly unit
  2. Transmitter antenna
  3. Transmitter
  4. Receiver antenna
  5. Receiver
  6. Signal conditioner



- d. Unified Link, Common Antenna plus Downlink [NCONF(4) = 4]
1. Baseband assembly unit
  2. Transmitter antenna (unified)
  3. Transmitter antenna (nonunified)
  4. Transmitter (unified)
  5. Transmitter (nonunified)
  6. Receiver
  7. Signal conditioner
  8. Diplexer
- e. Unified Link, Separate Antennas plus Downlink [NCONF(5) = 5]
1. Baseband assembly unit
  2. Transmitter antenna (unified)
  3. Transmitter antenna (nonunified)
  4. Transmitter (unified)
  5. Transmitter (nonunified)
  6. Receiver antenna
  7. Receiver
  8. Signal conditioner

#### 4.4.2 Communication with Main Program

The variables listed in the calling sequence are common to all subroutines which select hardware and are discussed in Paragraph 3.3.

In addition to the calling sequence, Subroutine COMM communicates with the main program via three COMMON blocks: USER-4, BTWN, and DBCOM. Variables coming through USER-4 are user inputs discussed in Paragraph 8.1 (see NAMELIST USRCM). The variables in BTWN and DBCOM are discussed in Paragraph 3.2.

#### 4.4.3 Variables Specified in DATA Statements

```
DATA SIGNOI/10., 10./, LMARG/6., 6./, SLANT/-1.E+10/,
      GTOT/-1.E+10/, GR/-1.E+10/, T/-1.E+10/, NF/-1.E+10/;
      TCLOSS/-0., 0./, POLOSS/0./, GAMMA/.1/, BETA/1.8/,
      GT/-1.E+10, -1.E+10/, MODX/0., 0./, ANTLOS/0./,
      COVER/0./
```

where:

SIGNOI(2) = Signal-to-noise ratios for transmitter(s)  
(dB)

LMARG(2) = Link margin(s) (dB)  
 SLANT = Slant range (nmi)  
 GTOT = Gain-to-temperature ratio  
 GR = Receiving antenna (downlink) gain (dB)  
 T = System noise temperature ( $^{\circ}$ K)  
 NF = Noise figure (dB)  
 TCLOSS(2) = Transmitter(s) circuit loss  
 POLOSS = Polarization loss  
 ANTLOS = Satellite antenna off-axis loss  
 GAMMA = PRN modulation index  
 BETA = Subcarrier modulation index  
 GT(2) = Antenna(s) gain (dB)  
 MODX(2) = Transmitter(s) modulation type  
           MODX = 0 no equipment dependence  
           MODX = 1 phase modulation  
           MODX = 2 frequency modulation  
           MODX = 3 amplitude modulation  
 COVER = Transmitter antenna coverage (in percent)

#### 4.4.4 Other Subroutines Called

##### 4.4.4.1 Subroutine BESS (X, BESJ, NMAX)

This subroutine uses a recursive procedure for evaluating tables of the Bessel function,  $J_n(x)$ .

The variables in the calling sequence are defined as follows:

X = floating point single precision argument  
 BESJ = one-dimensional array of values of  $J_n(x)$   
 NMAX = one less than the number of values in BESJ array:  
           i.e.,  $BESJ(n+1) = J_n(x)$ ,  $n = 0, \dots, NMAX/$

##### 4.4.4.2 Function RESET (K)

This subroutine, as the name implies, resets or initializes equipment indices in the data base.

4.5 SUBROUTINE EP (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

4.5.1 Purpose of Subroutine

The electrical power subroutine selects hardware which is required to regulate the electrical power for the spacecraft and batteries to store the electrical power. Six configurations are considered in the subroutine. These configurations are characterized by the nature of the regulation and the configuration of the solar arrays.

All regulators, batteries and battery chargers are selected by comparing appropriate attributes listed in the data base with satellite performance determined by the model. Regulators are selected on the basis of their ability to regulate the power load, batteries on the basis of the capacity needed during the eclipse portion of orbit, and battery chargers on the basis of being able to use the excess power to store energy back into the battery.

The model does not include selection criteria for power control units, central control units, solar power distributor, and power distributors. The first equipments available in the data base are simply called up. The solar array area and weight are based primarily on the average power load required for the spacecraft.

The sequences in which equipments are selected in each configuration are given below:

- a. Shunt Regulation - Paddle and Body Mounted Arrays  
[NCONF(5) = 1 or 2]
  1. Shunt regulator
  2. Battery
  3. Battery charger
  4. Power control unit
- b. Shunt and Discharge Regulation - Paddle and Body Mounted Arrays  
[NCONF(5) = 3 or 4]
  1. Discharge regulator
  2. Shunt regulator
  3. Battery
  4. Battery charger
  5. Central control unit

c. Series Load Regulation - Paddle and Body Mounted Arrays  
[NCONF(5) = 5 or 6]

1. Series load regulator
2. Battery
3. Battery charger
4. Power distributors
5. Solar power distributors.

4.5.2 Communication with Main Program

The variables listed in the calling sequence are common to all subroutines which select hardware and are discussed in Paragraph 3.3.

In addition to the calling sequence, subroutine EP communicates with the main program via four named COMMON blocks: USER-5, USER-I, BTWN, and DBCOM. Variables coming through USER-5 and USER-I are user inputs discussed in Paragraph 8.1 (see NAMELISTs USREP and USRI). The variables in BTWN and DBCOM are discussed in Paragraph 3.2.

4.5.3 Variables Specified in DATA Statements

DATA DELF/.03/, DELI/.02/, DELM/.01/, ETAI/.105/,  
ETAR/1.0/, K1/1.02/, K2/1.4/, LMBDP/.9/, SOL/1353/,  
VC/1.1/, PIE/3.1416/, CHMINT/2.0/

where:

DELF	=	Coverglass and coverglass adhesive transmissivity loss factor (dimensionless)
DELI	=	Array fabrication loss factor (dimensionless)
DELM	=	Miscellaneous loss factor (dimensionless)
ETAI	=	Solar cell efficiency at 28°C, AMO illumination (dimensionless)
ETAR	=	Power distribution loss factor (array to loads)
K1	=	Battery packing factor (dimensionless)
K2	=	Battery structure weight factor (dimensionless)
LMBDP	=	Solar array factor (dimensionless) (active surface area/actual surface area)
SOL	=	Average solar intensity (watts/meter <sup>2</sup> )

VC = Minimum allowable cell voltage (V dc)

CHMINT = Minimum allowable charge time (hr)

4.5.4

Other Subroutines Called

None

## 5. SUBROUTINES WHICH DO NOT SELECT HARDWARE

### 5.1 SUBROUTINE FILTER (NCONF, ICODE)

#### 5.1.1 Purpose of Subroutine

Some combinations of configurations are known to be unacceptable. These are filtered out without the necessity of calling any subsystems. As an example, configuration 1 in S&C and configuration 1 in EP are incompatible because 1 in S&C is a spinning vehicle and 1 in EP requires solar array paddles which cannot be used on a spinning vehicle. A complete description of these restrictions is presented in Section 7.

#### 5.1.2 Communication with Main Program

NCONF is an array containing the number of each subsystem's configuration. ICODE is a return code of 0 for compatible configurations or -1 for unacceptable combinations of configurations.

FILTER also uses values from COMMONs USER-1, USER-3, USER-4, and USER-5, all of which are discussed in Paragraph 8.1.

#### 5.1.3 Variables Specified in DATA Statements

None

#### 5.1.4 Other Subroutines Called

None

### 5.2 SUBROUTINE INITIL (NCONF, IERRI)

#### 5.2.1 Purpose of Subroutine

Some values are needed before they are calculated. For example, subroutine SANDC needs moments and lengths which are calculated 'downstream' in vehicle sizing. Approximations for such values are calculated here.

### 5.2.2 Communication with Main Program

NCONF is as previously discussed. IERRI is a flag set when the estimated satellite diameter exceeds the maximum allowable size.

INITIL also uses values from USER-1 and USER-I (both described in Paragraph 8.1) and places values in BTWN (discussed in Paragraph 3.2)

### 5.2.3 Variables Specified in DATA Statements

None

### 5.2.4 Other Subroutines Called

None

## 5.3 SUBROUTINE READDB (IENDDB)

### 5.3.1 Purpose of Subroutine

This subroutine reads all data base values for one subsystem at a time and calculates the numbers to fill the IDB array. Of major importance are the equipment numbers which exist as the first two digits of the four digit equipment identification numbers. These are counted by groups (all 1's, all 2's, all 3's, . . . .) and these counts exist as IDB(1), IDB(2), and so on. The routine returns when equipment for the next subsystem is encountered, i. e., when the equipment numbers begin to decrease.

### 5.3.2 Communication with Main Program

IENDDB is the last column in the data base for the active subsystem. This is needed for the SAVE routine. DBCOM is filled by this routine (see Paragraph 3.2):

### 5.3.3 Variables Specified in DATA Statements

DATA STORE/55\*0. /

STORE = variable used for temporary storage

### 5.3.4 Other Subroutines Called

None

## 5.4 SUBROUTINE SAVE (IIN, NIN, NOWAT, ITEST, IENDDB)

### 5.4.1 Purpose of Subroutine

The purpose of this subroutine is to build matrices needed by other subsystems. Specifically this routine concatenates separate ICHOSE and NCHOSE arrays (with zeros taken out) which contain the hardware I. D. 's of equipment selected for the five satellite subsystems and the number of each equipment type. It also saves the data required to fill the COST, REL THM, DPIA, and SKD arrays for their subroutines.

### 5.4.2 Communication with Main Program

IIN and NIN are ICHOSE and NCHOSE of the active subsystem (described in Paragraph 3.3). NOWAT is described in Paragraph 3.3. ITEST is the largest possible number of types of equipment chosen by a subsystem. The two COMMON areas (DBCOM, CHOSE) which are also used for communication with the main program are discussed in Paragraph 3.2.

### 5.4.3 Variables Specified in DATA Statements

None

### 5.4.4 Other Subroutines Called

None

## 5.5 SUBROUTINE VESIZE (IERR, NCONF, ICHOSE)

### 5.5.1 Purpose of Subroutine

The vehicle sizing subroutine determines the satellite structural weight, the total weight, the satellite volume, dimensions, center of gravity locations and the satellite inertial characteristics. Three configurations are considered in the subroutine. These configurations are characterized by the shape of the equipment bay: cylinder, box, sphere.



The following quantities are computed in the sequence indicated:

- a. Equipment bay equipment weight and volume
- b. Equipment bay length
- c. Satellite length
- d. Solar array dimensions
- e. Equipment bay structural weight
- f. Mission equipment bay structural weight
- g. Mission equipment support weight
- h. Total volume of mission equipment bay
- i. Solar array boom and mechanism weight (paddles)
- j. Total mission equipment and external equipment weight and volume
- k. Harness weight
- l. Structural thermal protection system weight
- m. Satellite dry weight
- n. Satellite gross weight
- o. Satellite launch weight
- p. Mission equipment and mission equipment bay structure CGs
- q. Equipment bay structure CGs
- r. External equipment CGs
- s. Solar array CGs
- t. Satellite CGs
- u. Equipment bay structure and equipment bay equipment incremental inertia
- v. External equipment incremental inertia
- w. Solar array incremental inertia
- x. Mission equipment bay incremental inertia
- y. Total satellite inertia
- z. Distance from satellite CG to main engine
- a. Gas jet lever arms on roll, pitch, and yaw axes

### 5.5.2 Communication with Main Program

All three variables listed in the calling sequence are discussed in Paragraph 3.3. (In this subroutine ICHOSE is a scalar which is set to -1 when the current design is unacceptable.)

In addition to the calling sequence, subroutine VESIZE communicates with the main program via three COMMON blocks: USER-I, USER-6, and BTWN. Variables coming through USER-I and USER-6 are user inputs discussed in Paragraph 8.1 (see NAMELISTs USRI and USRVS). The variables in BTWN are discussed in Paragraph 3.2.

### 5.5.3 Variables Specified in DATA Statements

None

### 5.5.4 Other Subroutines Called

None

## 5.6 SUBROUTINE STRUCT (NCONF)

### 5.6.1 Purpose of Subroutine

The structures subroutine specifies the satellite loads environment and sizes the solar array extension supports, the equipment bay structure, the end covers and the midsection bulkhead if appropriate. One configuration is considered in the subroutine. This configuration is characterized by the type of equipment bay structure: semi-monocoque.

The following quantities are computed in the sequence indicated:

- a. Solar array paddle applied load
- b. Nominal radius and wall thickness of solar array extension supports
- c. Loads applied to equipment bay structure
- d. Equivalent axial load on semi-monocoque structure
- e. Equivalent thickness of stiffened cylinder
- f. Skin thickness of skin-stringer assembly

- g. Stringer thickness, height, spacing, and efficiency
- h. Number of stringers
- i. Cylinder frame, radius of gyration, area, height, thickness and spacing
- j. Number of frames
- k. Forward and aft end cover thickness
- l. Applied uniform load on midsection bulkhead
- m. Midsection bulkhead thickness

If the equipment bay shape is a box instead of a cylinder, quantities comparable to those listed above in steps d - k are computed for the box shape.

#### 5.6.2 Communication with Main Program

The variable in the calling sequence is discussed in Paragraph 3.3. In addition to the calling sequence, subroutine STRUCT communicates with the main program via three COMMON blocks: USER-6, USER-7, and BTWN. Variables coming through USER-6 and USER-7 are user inputs discussed in Paragraph 8.1 (see NAMELISTs USRVS and USRST). The variables in BTWN are discussed in Paragraph 3.2.

#### 5.6.3 Variables Specified in DATA Statements

DATA E, XNU, RHO, SIGY, PI/1.E7, .33, .1, 3.E4, 3.1416/

where:

E	=	Young's modulus (psi)
XNU	=	Poisson's ratio
RHO	=	Weight density (lb/in <sup>3</sup> )
SIGY	=	Yield stress (psi)

#### 5.6.4 Other Subroutines Called

None

## 5.7 SUBROUTINE RELY (IRIN, IDS, NEQUIP)

### 5.7.1 Purpose of Subroutine

The reliability subroutine incrementally increases the level of redundancy in the spacecraft system until the system reliability, R(TRUNC), and the mean mission duration, MMD, specifications are met. The procedure is constrained by a maximum total satellite weight on cost and available equipment reserves. The subroutine operates to meet the system reliability specification prior to meeting the mean mission duration requirement.

The principle of operation is to add a redundancy to a single module, then calculate the new system reliability and the payoff, as defined by

$$RHO = \frac{\Delta R(TRUNC)}{\Delta \text{weight}}$$

This is repeated for each module where equipment reserves are available. The module offering the greatest payoff is selected, and the following three tests are applied:

- a. Is RHO large enough? (The threshold is preselected.)
- b. Is spacecraft weight or cost below the maximum allowed?
- c. Is the R(TRUNC) still short of the requirement?

If these tests are passed, the subroutine begins the selection process again. This loop is retraced until one or more of the tests is failed. Failure of tests a or b results in termination of the design procedure. If a configuration is found which meets the system reliability requirement, then the above is repeated replacing R(TRUNC) with MMD. A final design is recognized as optimum subject to the imposed R(TRUNC), MMD, weight, and cost constraints.

The subroutine contains the additional feature in that subsystem reliabilities may be specified. The task of meeting subsystem requirements is performed prior to any total system considerations. The same logic as presented above is used for determining the appropriate subsystem redundancies.

### 5.7.2 Communication with Main Program

The variables listed in the calling sequence are: a return indicator, a double string design indicator, and a vector of the number of equipment types per subsystem, respectively.

Subroutine RELY additionally communicates with the main program through the COMMON blocks: USERR, USER-5, BTWN, and CHOSE. Variables in USERR and USER-5 are user inputs and are discussed in Paragraph 8.1 (see NAMELISTs USRRE and USREP). The variables in BTWN and CHOSE are discussed in Paragraph 3.2.

### 5.7.3 Variables Specified in DATA Statements

None

### 5.7.4 Other Subroutines Called

#### 5.7.4.1 Subroutine RIMOD (J, DELH, ITRUNC, NT, IADD, IOPT

Subroutine RIMOD is called by subroutine RELY. Subroutine RIMOD computes the reliability function for a specified module with or without a redundancy added. Five different models are used, depending on the failure mode of an individual module. The calling parameters are:

J	=	Current module number
DELH	=	Time increment
ITRUNC	=	Number of time points
NT	=	Input option
IADD	=	Input option
IOPT	=	Input option

Parameters passed through COMMON block CHOSE are:

NCHOSE	=	Initial number of elements by module
SYSPAR	=	Matrix of model parameters (called DATAB in subroutine RELY)

Parameters passed through COMMON block DBCOM are:

R = Resultant reliability function  
NR = Number of redundancies by module

#### 5.7.4.2 Subroutine QSF (H, Y, Z, NDIM)

Subroutine QSF is called by subroutine RELY. Subroutine QSF computes a vector of integral values for a given equidistant table of function values. QSF is a member of the System/360 Scientific Subroutine Package. The calling parameters are:

H = Increment of argument values  
Y = Input vector of function values  
Z = Resulting vector of integral values  
NDIM = Dimension of vectors Y and Z

No parameters are passed in common.

#### 5.7.4.3 Subroutine GAM (X)

The function GAM is called by RIMOD. Function GAM computes the gamma function of its argument, X. GAM uses a polynomial approximation on the interval (1.0, 2.0).

#### 5.7.4.4 Subroutine CERF (X)

The function CERF is called by RIMOD. Function CERF computes the error function for X in (0.0, 4.0) and the compliment of the error function for X in (4.0,  $\infty$ ). A Chebyshev approximation is used in both cases.

### 5.8 SUBROUTINE THRML (IERR, NCONF)

#### 5.8.1 Purpose of Subroutine

The thermal sizing subroutine determines the phase change material weight, insulation area, heater power, radiator area, and types of heat pipes to be used. Various configurations are considered in the

subroutines dependent upon variables such as orbit, shape of vehicle, type of stabilization, power requirements, temperature limits, and battery temperatures. These variables are determined elsewhere in the model and passed to THRML via the common blocks.

The output quantities are computed in the following sequence:

- a. Radiator area (RADA)
- b. Heater power (HTRPWR)
- c. Heat pipe (HTPIPE)
- d. Battery radiator area (RADAB)
- e. Battery heater power (HTRPRB)
- f. Battery variable conductance heat pipe (VCHP)
- g. Total radiator area (RAT)
- h. Total heater power (HPT)
- i. Total heat pipes (HTPT)

#### 5.8.2 Communication with Main Program

Both variables listed in the calling sequence are discussed in Paragraph 3.3.

In addition to the calling sequence, subroutine THRML communicates with the main program via four COMMON blocks: USER-I, USER-7, CHOSE, and BTWN. Variables coming through USER-I and USER-7 are user inputs discussed in Paragraph 8.1 (see NAMELIST USRI and USRTH). The variables in BTWN and CHOSE are discussed in Paragraph 3.2.

#### 5.8.3 Variables Specified in DATA Statements

DATA SIGMA/0.1714 E-08/, QS/442./, EMISS/60./,  
ALBDO/155./, CONST/1.5/, PIE/3.1416/

where:

SIGMA = Boltzmann constant in Btu/(hr-ft-deg R<sup>4</sup>)  
QS = Solar constant in Btu/(hr-ft<sup>2</sup>)

EMISS = Earth emission in Btu/(hr-ft<sup>2</sup>)  
 ALBDO = The Albedo in Btu/(hr-ft<sup>2</sup>)  
 CONST = The K constant (dimensionless)

5.8.4 Other Subroutines Called

None

5.9 SUBROUTINE COSTS (NCONF, NEQUIP)

5.9.1 Purpose of Subroutine

The cost subroutine determines the cost of building and integrating a payload from the design engineering phase to the launch phase. Costs are broken down into the following categories (variable names are in parenthesis):

<u>DDT&amp;E (Nonrecurring)</u>	<u>Investment (Recurring)</u>
Design engineering (DE)	Unit engineering (PE)
Test and evaluation (TE)	Unit production (PU)
Tooling and equipment (TOOLR)	Tooling and equipment (TOOLU)
Quality control (QCR)	Quality control (QCU)
Systems engineering and integration (SEIR)	Systems engineering and integration (SEIP)
Program management (PMR)	Program management (PMP)

Other costs which are computed are listed in the table below (variable names are written in where computed):

<u>Cost Category</u>	<u>DDT&amp;E</u>	<u>Investment</u>	<u>Operations</u>
Spacecraft	SATR	SATINV	
Mission equipment	XMER	XMEINV	
Total payload	PAYR	PAYINV	
Quality Units	PAYQUL		
GSE	GSE		
Launch support			XLTOT



<u>Cost Category</u>	<u>DDT&amp;E</u>	<u>Investment</u>	<u>Operations</u>
Flight operations			CTOT
Contractor fee	FEER	FEEINV	FEEOPS
Program total	DDTE	XVEST	OPS

#### 5.9.2 Communication with Main Program

Both variables listed in the calling sequence are discussed in Paragraph 3.3.

In addition to the calling sequence, subroutine COSTS communicates with the main program via four COMMON blocks: USERC, BTWN, CHOSE, and PRTCOM. Variables coming through USERC are user inputs discussed in Paragraph 8.1 (see NAMELIST USRCS). The variables in BTWN, CHOSE, and PRTCOM are discussed in Paragraph 3.2.

#### 5.9.3 Variables Specified in DATA Statements

DATA FR, FP, FT, FE, RE, RT, RP, BE, BT, BP, PI, SF

where:

FR(6) = Subsystem design engineering cost factor  
 FP(6) = Subsystem unit production cost factor  
 FE(6) = Subsystem unit engineering cost factor  
 FT(6) = Subsystem test evaluation cost factor  
 RE(6) = Design engineering CER constant  
 RT(6) = Test evaluation CER constant  
 RP(6) = Production CER constant  
 BE(6) = Design engineering CER exponent  
 BT(6) = Test evaluation CER exponent  
 BP(6) = Production CER exponent

The six values in each of the above arrays are associated with the following equipment or systems in the order indicated:

- a. Solar array
- b. Wiring harness

- c. Thermal
- d. Converters
- e. Propellant feed systems
- f. Structures

In addition:

PI = Price index (i.e., change of the value of the dollars)

SF = Optional factor (e.g., standardization factor)

#### 5.9.4 Other Subroutines Called

None

### 5.10 SUBROUTINE SKED (NEQUIP, NCONF)

#### 5.10.1 Purpose of Subroutine

The purpose of this subroutine is to calculate component development lead time, subsystem development, component qualification time, subsystem qualification lead time, test lead time, and a total time for each subsystem and for the mission equipment. The critical path is determined and the associated times are passed to the PRNT routine.

#### 5.10.2 Communication with Main Program

Both variables in the calling sequence are discussed in Paragraph 3.3. Subroutine SKED also communicates with the main program via three COMMON areas: CHOSE, USER-8, and PRTCUM. Variables coming through USER-8 are user inputs discussed in Paragraph 8.1 (see NAMELIST VSRSK). The variables in BTWN and PRTCUM are discussed in Paragraph 3.2.

#### 5.10.3 Variables Specified in DATA Statements

DATA CONF, ICI

where:

CONF(22, 5) = Configuration dependent weighting factors

ICI(5) = Index with which the CONF array is addressed

5.10.4 Other Subroutines Called

None

5.11 SUBROUTINE PRNT (IERR, NEQUIP, NACCEP, NCONF)

5.11.1 Purpose of Subroutine

This subroutine prints all output determined by the model. A sample of the output may be found in Paragraph 8.3. The output consists of a glossary and acceptable design attributes for the specified mission.

5.11.2 Communication with Main Program

The variables IERR and NCONF listed in the calling sequence are discussed in Paragraph 3.3. NEQUIP is discussed in Paragraph 3.1. NACCEP is a counter maintained by MAIN and used only by PRNT. It is the acceptable design number identifying the particular run.

In addition to the calling sequence, subroutine PRNT communicates with the main program via four COMMON blocks: BTWN, PRTCOM, CHOSE, and DBCOM. The variables in these common areas are discussed in Paragraph 3.2.

5.11.3 Variables Specified in DATA Statements

None

5.11.4 Other Subroutines Called

None

## 6. DATA BASE

Paragraph 6.1 contains the discussion of the data base, the position of the attributes contained therein, and a description of the data base tape. Paragraph 6.2 discusses the PRESORT program which may reorder the data base as an input to the model.

### 6.1 FORMAT

The data base tape is a seven track, BCD tape, 800 bpi and blocked 84 characters per record. The format is illustrated in Figure 6-1.

Equipments in the data base are ordered by: (1) subsystems, (2) configuration within each subsystem, and (3) equipment types within each configuration [sized equipment(s) first, selected equipment(s) second]. Within equipment types, the equipment is ordered according to the prime technical performance parameter. (This ordering may be changed by the PRESORT routine discussed in Paragraph 6.2.) A list of the data base equipment in the order determined by these considerations is given below:

- a. Stabilization and Control
  1. Despin mechanical and electronics assembly
  2. Valve driver assembly
  3. Sun sensor with electronics
  4. Nutation damper
  5. Gimbal electronics assembly
  6. Control timing assembly
  7. Biaxial drive assembly
  8. Nonscanning earth sensor
  9. Sun sensor with electronics
  10. Control electronics assembly
  11. Rate gyro assembly
  12. Horizon sensor
  13. Reaction wheel
  14. Power converter
  15. Attitude reference electronics
  16. Valve driver assembly
  17. Rate integrating gyros

18. Horizon sensor (with electronics)
  19. Electronics processing assembly
  20. Single gimbal control moment gyro
  21. Star sensor with electronics
  22. Electronic error processor
- b. Auxiliary Propulsion
1. Cold gas pneumatic thruster
  2. Cold gas isolation valve
  3. Cold gas filter
  4. Cold gas pressure regulator
  5. Cold gas pneumatic tank
  6. Cold gas fill and vent valve
  7. Cold gas relief valve
  8. Monopropellant thruster
  9. Monopropellant isolation valve
  10. Monopropellant filter
  11. Monopropellant spherical tank
  12. Monopropellant fill valve
  13. Bipropellant thruster
  14. Bipropellant isolation valve
  15. Bipropellant filter
  16. Bipropellant tank
  17. Bipropellant fill valve
- c. Data Processing and Instrumentation
1. General purpose processor
  2. Special purpose processor (digital telemetry unit)
- d. Communications
1. Base band assembly unit
  2. Antenna
  3. Transmitters
  4. Receiver
  5. Signal conditioner
  6. Diplexer
  7. Converters (transmitter and receiver)
- e. Electrical Power
1. Shunt regulator
  2. Battery cells
  3. Battery charger
  4. Discharge regulator
  5. Shunt regulator
  6. Battery charger

7. Central control unit
8. Series load regulator
9. Battery charger
10. Solar power distributor
11. Power distributor
12. Power control unit

## 6.2 PRESORT

A small program exists to sort the data base prior to submitting a run for obtaining preliminary spacecraft designs. It will sort the data base according to weight, cost (data base row 46 or 48), or reliability. A single digit in Column 1 of a card (to be read on unit 5) determines the sort-variable: 1 = weight, 2 or 3 = cost (row 46 or 48), 4 = reliability. Input tape is expected on unit 8. Output tape is unit 9. Either disk or tape is acceptable for both input and output. Output should be input to the main run. If this presort capability is not used, the order of the data base is determined by technical performance as discussed in Paragraph 6.1.

Identification

1	ID CO Type	E5.0 A2 3A6	Card 1
2			
3			
4			
5			

Technical Characteristics

6	T.P. 1 2 3 4 5	5E10.0	
7			
8			
9			
10			

11	6	8E10.0	Card 2
12	7		
13	8		
14	9		
15	10		

Performance

16	Ave Pow Max Pow Min Pow		
17			
18			

19	Nom Volt Max Volt Min Volt C or I Weight Volume Rand Vib N-Rand	8E10.0	Card 3
20			
21			
22			
23			
24			
25			
26			

27	Max Temp Min Temp Press		
28			
29			

CDPI Inputs

27	Max Temp Min Temp Press	8E10.0	Card 4
28			
29			
30	No. Pow Cmd No. Other Cmd Time Tags No. Hi 'T' Ana No. Hi 'T' Dig		
31			
32			
33			
34			

Figure 6-1. Data Base Format (7 Cards/Equipment)

Safety	35	Samp Rate Granularity No. Lo 'T' Ana No. Lo 'T' Dig Samp Rate Granularity	8E10.0	Card 5
	36			
	37			
	38			
	39			
40				
Cost	41	Fail Mod $\lambda$ or $\mu$ $\sigma$  q Max Redund	8E10.0	Card 6
	42			
	43			
	44			
	45			
Schedule	46	D. E. Cst T. E. Cst Unit Prod Ref Quant Factor	8E10.0	Card 6
	47			
	48			
	49			
	50			
Schedule	51	Devel Const  Devel Var Qual Const Qual Var State-Art	5E10.0	Card 7
	52			
	53			
	54			
	55			

Figure 6-1. Data Base Format (7 Cards/Equipment) (Continued)



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## 7. RESTRICTIONS AND/OR LIMITATIONS

The following tables detail both restrictions and limitations of the model. The first type of restriction is that of some configurations not being compatible with the user requirements. Both analyses and actual flight experience show that limitations exist for the utilization and performance of each of the Stabilization and Control configurations. These limitations are shown in Table 7-1. The second type of restriction is that of incompatibility between subsystems which is shown in Tables 7-2 through 7-8.

Table 7-1. Stabilization and Control Configuration Selection

Requirements	Dual Spin	Yaw Spin	Three-Axis Mass Expulsion	ME with CMGs	ME and Momentum Wheel
Payload yaw scan requirement	No	Yes	No	No	No
Orientation					
Inertial	Yes	No	Yes	Yes	Yes
Earth pointing	Yes	Yes	Yes	Yes	Yes
Sun pointing	Yes	No	Yes	Yes	Yes
Maneuverability requirements					
Powered flight control	Yes	Yes	Yes	Yes	Yes
Stationkeeping	Yes	Yes	Yes	Yes	Yes
Orbit correction control	Yes	Yes	Yes	Yes	Yes
Vehicle slewing	No	Yes	Yes	Yes	No
Altitude					
185-566 km (100-300 mi)	Yes	Yes	Yes	Yes	Yes
556-46,300 km (300-25,000 mi)	Yes	Yes	Yes	Yes	Yes
>46,300 km (25,000 mi)	Yes	Yes	Yes	Yes	Yes
Pointing accuracy					
35-170 mrad (2-10 deg)	Yes	Yes	Yes	Yes	Yes
3.5-35 mrad (0.2-2 deg)	Yes	Yes	Yes	Yes	Yes
0.17-3.5 mrad (0.01-0.2 deg)	Yes	No	No	Yes	No
<0.17 mrad (<0.01 deg)	No	No	No	Yes	No
Rate accuracy					
1.7-17 mrad/sec (0.1-1.0 deg/sec)	Yes	Yes	Yes	Yes	Yes
0.17-1.7 mrad/sec (0.01-0.1 deg/sec)	Yes	Yes	Yes	Yes	Yes
<0.17 mrad/sec (0.01 deg/sec)	No	No	No	Yes	No

Legend:

- Yes - Configuration can be used
- No - Configuration cannot be used

Table 7-2. Stabilization and Control Configuration Compatibility

Stabilization and Control Subsystem Configurations	Data Processing Subsystem	
	General Purpose Processors	Special Purpose Processors
Dual Spin	Yes	Yes
Yaw Spin	Yes	Yes
Three-Axis Mass Expulsion	Yes	Yes
Mass Expulsion with Control Moment Gyros	Yes	No
Mass Expulsion with Pitch Momentum Wheel	Yes	Yes

Legend:

Yes - Compatible  
 No - Incompatible

Table 7-3. Auxiliary Propulsion Configuration Selection

Input Requirements	Cold Gas	Monopropellant	Bipropellant
Thrust			
< 224 newtons (< 50 lb)	Yes	Yes	Yes
224-4450 newtons (50-1000 lb)	No	Yes	Yes
> 4450 newtons (> 1000 lb)	No	No	Yes
Total Impulse			
< $4.4 \times 10^4$ newton-sec (< $10^4$ lb-sec)	Yes	No	No
$4.4 \times 10^4 - 2.2 \times 10^5$ newton-sec ( $10^4 - 5 \times 10^4$ lb-sec)	Yes	Yes	No
$2.2 \times 10^5 - 8.9 \times 10^5$ newton-sec ( $5 \times 10^4 - 2 \times 10^5$ lb-sec)	No	Yes	Yes
> $8.9 \times 10^5$ newton-sec ( $2 \times 10^5$ lb-sec)	No	No	Yes

Legend:

- Yes - Acceptable
- No - Unacceptable

Table 7-4. Data Processing Configuration Compatibility

Communication Configuration	General Purpose Processor	Special Purpose Processors	
		1 DTU	2 DTUs
Uplink, plus downlink	Yes (1 Data Rate Computed)	Yes	No
Unified link, common antenna	Yes (1 Data Rate Computed)	Yes	No
Unified link, separate antennas	Yes (1 Data Rate Computed)	Yes	No
Unified link, common antenna plus downlink	Yes (2 Data Rates Computed)	No	Yes
Unified link, separate antennas plus downlink	Yes (2 Data Rates Computed)	No	Yes

Legend:

- Yes - Compatible
- No - Incompatible

Table 7-5. Communication Configuration Selection

Configurations	Ranging Requirement	Separate Mission Link Requirement	Separate Antenna Requirement
Uplink plus downlink	No	No	Yes
Unified link, common antenna	Yes	No	No
Unified link, separate antennas	Yes	No	Yes
Unified link, common antenna plus downlink	Yes	Yes	No
Unified link, separate antennas plus downlink	Yes	Yes	Yes

Legend:

Yes - Acceptable

No - Unacceptable

Table 7-6. Electrical Power Configuration Compatibility

Configuration	Vehicle Orientation		Voltage Requirements	
	Spinning	Nonspinning	Unregulated	Regulated
Solar Arrays				
Body Mounted	Yes	Yes		
Oriented Paddles	No	Yes		
Voltage Regulation				
Shunt			Yes	No
Shunt and Discharge			Yes	Yes
Series			Yes	Yes

Legend:

Yes - Compatible

No - Incompatible



Table 7-7. Vehicle Shape Compatibility

S&C Configuration	Cylinder	Sphere	Box
Spinning	Yes	Yes	No
3-Axis	Yes	Yes	Yes

Legend:

- Yes - Compatible
- No - Incompatible

Table 7-8. Structural Configuration Compatibility

Structural Configuration	Vehicle Shape		
	Cylinder	Sphere	Box
Monocoque	Yes	No	Yes
Semi-Monocoque	Yes	No	Yes
Truss	Yes	Yes	Yes

Legend:

- Yes - Compatible
- No - Incompatible

## 8. SAMPLE TEST CASE

Paragraph 8.1 discusses the input variables to the model. Paragraph 8.2 discusses values that were used in the sample test case. Paragraph 8.3 contains the results of the sample test case.

### 8.1 USER INPUT VARIABLE LIST

Inputs to the model are listed in Table 8-1. NAMELIST names are shown in the parenthesis. All NAMELIST blocks must be in the order given. If the user wishes to use the default parameters, the variables need not be entered. However, NAMELIST control input must exist for each NAMELIST section. For example:

```
$ MODE
$ END
$ USRSC
$ END
.
.
.
$ USRCS
$ END
```

### 8.2 INPUT VARIABLES FOR TEST CASE

Figure 8-1 lists the variables which were changed for the sample test case. Only those variables that are changed from the default need to be entered.

### 8.3 SAMPLE TEST CASE RESULTS

The test case corresponded to the DSCS-II satellite. This satellite provides for expanded communications service for worldwide military installations and the National Command Authority. The satellite is drum-

shaped. Two dish antennas on top of the spacecraft are deployed in orbit to provide narrow beam coverage. Conical horn earth coverage antennas are mounted on top of the spacecraft. An omnidirectional command and telemetry antenna is deployed beneath the main body. Communications equipment is mounted on a mechanically despun platform. Other subsystems are housed in the main body of the spacecraft. The test case results are presented in Figure 8-2.

Table 8-1. User Input List

<u>FORTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>General (MODE)</u>			
MICRO	0		Set to 0 for macro, set to 1, 2, 3, 4 or 5 for micro. If 0, program operates in macro mode. If 1, 2, 3, 4, or 5, program performs micro search for SANDC, AUXPRO, DPI, COMM, or EP subsystem respectively. For micro search on a specific subsystem, user must restrict all other subsystems to one configuration each.
ISTR1	1		First of all allowable five configurations to be designed for the SANDC subsystem. ISTR1 and IEND1 effectively limit the number of SANDC configurations whose designs will be attempted. (Must be equal to IEND1 for micro search on another subsystem.)
IEND2	5		Last of the allowable five configurations to be designed for the SANDC subsystem.
ISTR2	} 1-3		As above for auxiliary propulsion
IEND2			
ISTR3	} 1-2		As above for data processing and instrumentation
IEND3			
ISTR4	} 1-5		As above for communications
IEND4			
ISTR5	} 1-6		As above for electrical power
IEND5			
ISTR6	} 1-3		As above for vehicle sizing
IEND6			
ISTRTR	} 0-1		As above for reliability
IENDR			
<u>Stabilization and Control (USRSC)</u>			
DPHI	.25	deg	Main engine alignment to thrust axis
FE	4.1	lb	Thrust (translational)
TSMALL	100.	sec	Main engine burn time
XNU	3.	---	Control system efficiency
PDOTO	1.	deg/sec	Maximum initial rate
TAUX	} 62208000.		Times that disturbance torques are in effect
TAUY			
TAUZ			
T	24.	mo	Mission lifetime

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Table 8-1. User Input List (Continued)

<u>FORTTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>Stabilization and Control (USRSC) (Continued)</u>			
PHIRX	.75	deg	Required accuracy on roll, pitch, and yaw axes
PHIRY	.75		
PHIRZ			
PDOTX	1.	deg/sec	Maximum maneuver rates
PDOTY	1.		
PDOTZ			
XN	1.	---	Number of maneuver about roll, pitch, and yaw axes
YN	1.		
ZN	1.		
PDOTRX	.012	deg/sec	Required system rate accuracy
PDOTRY	.012		
PDOTRZ	.012		
OMEGS	1.5708	rad/sec	Spin rate about yaw axis (applies only to yaw spin configuration)
OMEGR	60.	rpm	Spin rate of rotor (applies only to dual spin configuration)
PJ	75.	slug/ft <sup>2</sup>	Platform spin axis inertia (applies only to dual spin configuration)
XNN	21.	days	Time between spin axis corrections (applies only to dual spin configuration)
K	1	---	0 if errors for spin axis relative to nadir; 1 if errors for payload relative to nadir (applies only to dual spin configuration)
MANV	1	---	1 = power flight control, 2 = station keeping, 3 = orbit correction control, 4 = vehicle slewing
IPAWAW	0	---	0 to 1 for payload yaw required (no or yes)
EPI	.0001	deg/sec	Maximum programmed pitchover rate (applies only to three-axis mass expulsion configuration)
AX	.05	deg	Misalignment errors in mounting inertia measurement units (applies only to three-axis mass expulsion configuration)
AY	.05		
AZ	.05		
EA	0.10	deg	Antenna misalignment (applies only to pitch momentum bias configuration)
EANT	0.1	rad	Antenna elevation (applies only to pitch momentum bias configuration)

Table 8-1. User Input List (Continued)

<u>FORTTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>Stabilization and Control (USRSC) (Continued)</u>			
ALPHA	12.0	deg	Thruster offset in roll-yaw plane (applies only to pitch momentum bias configuration)
TL	1.0	day	Time between unloading wheel momentum (applies only to CMG configuration)
TACCEL	20.0	sec	Acceleration time for maneuvering (applies only to CMG configuration)
XNNN	4.0	---	Number of single gimballed gyros (applies only to CMG configuration)
THOLD	100000.	min	Time vehicle in inertial hold (applies only to CMG configuration)
PDOTAV	0.01	deg/sec	Average body rate for low orbit when high accuracy is required (applies only to CMG configuration)
PDTST	0.0667	deg/sec	Maximum rate at which star information is obtained (applies only to CMG configuration)
PHIFOV	40.0	deg	Maximum range of attitude freedom required to track specific stars (applies only to CMG configuration)
ISAT			Earth painting flag. Equivalent to ISATOR in Thermal (do <u>not</u> input)
<u>Auxiliary Propulsion (USRAP)</u>			
CLIFE	50,000.	cycles	Cycle (or pulse) life
BTRMX	$1.024 \times 10^6$	bit/sec	Maximum bit rate
SLSFL	0.	---	Special command synchronization flag (0 means no synchronization required, 1 means synchronization required)
TPRFL	0.	---	Telemetry processing flag (0 means telemetry processed separately, 1 means otherwise)
OPSMS	0.	ops/sec	Number of mission operations
ARRAYN(11, 3)	0	---	Mission data for up to three (3) equipments: Power switching commands Other commands Time tagged commands High rate telemetry Number of analog points Number of digital points Sample rate ( $\text{sec}^{-1}$ ) Word length (bits) Low rate telemetry Number of analog points Number of digital points Sample rate ( $\text{sec}^{-1}$ ) Word length (bits)

Table 8-1. User Input List (Continued)

<u>FORTTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>Auxiliary Propulsion (USRAP) (Continued)</u>			
MISPD	0	---	Mission data processing flag (1 means processing required, 0 means no such processing required)
NMSEQ	0	---	Number of mission equipment (maximum of 3)
<u>Communications (USRCM)</u>			
IOPTCM(3)	0, 0, 0	---	IOPTCM(1) is ranging IOPTCM(2) is separate link IOPTCM(3) is separate antenna (0 or 1 for no or yes)
LSGLS	1	---	Link SGLS flag (0 = no, 1 = yes)
LUSB	0	---	Link USB flag (0 = no, 1 = yes)
FREQX(2)	2250., 2250	MHz	Frequency of downlink transmitters (Second number refers to separate downlink)
APOGEE	500.	nmi	Apogee (must be less than or equal to ALT)
NET	1	---	1 = NASA net, 0 = AFSCF net
NADIR	0	---	Nadir coverage flag (0 = no, 1 = yes)
FREQR	1800	MHz	Receiver frequency
COMRAT	1000.	baud	Receiver command rate
BWIDTH(2)	-1.E10, -1.E10	Hz	Bandwidth for transmitter (default values are flags that cause bandwidth to be computed as a function of bit rate)
<u>Electrical Power (USREP)</u>			
OPTEMP	15.	°C	Battery temperature
IVOLT	0	---	Flag 0 = voltage need not be regulated 1 = voltage regulated
<u>Vehicle Sizing (USRVS)</u>			
EQPF	2.	---	Equipment packing factor
MB12SH	1	---	Mission equipment bay shape (1 means cylinder, 2 means box)
EQM1XL	40.	in.	No. 1 mission equipment bay length
EQM1YL	40.	in.	No. 1 mission equipment bay width
EQM1ZL	40.	in.	No. 1 mission equipment bay height
EQM2XL	40.	in.	No. 2 mission equipment bay length
EQM2YL	40.	in.	No. 2 mission equipment bay width
EQM2ZL	40.	in.	No. 2 mission equipment bay height

Table 8-1. User Input List (Continued)

<u>FORTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>Vehicle Sizing (USRVS) (Continued)</u>			
ISBOFG	0	---	Solar array boom orientation (0 means not oriented, 1 means oriented)
NUMEEQ	0	---	Number of external equipments (maximum = 9)
EEQWT(9)	0	lb	External equipment weight
EEQVL(9)	0	ft <sup>3</sup>	External equipment volume
EM1YCG	0	in.	Mission equipment CGs relative to equipment bay interface
EM1ZCG	0	in.	
EM2YCG	0	in.	
EM2ZCG	0	in.	
CGEEX(9)	2.	---	Location of external equipment (1 means front, 2 means center, 3 means aft end)
EELOC(9)	3.	---	Location of external equipment (1 means right, 2 means left, 3 means top, 4 means bottom)
XCGSA1	1.	---	Location of solar paddles (1 means front, 2 means center, 3 means aft end)
XCGSA3	1.	---	Location of body mounted solar array (1 means front, 2 means center, 3 means aft end)
<u>Miscellaneous (USR1)</u>			
EQM1WT	435.	lb	Mission equipment weight (must be zeroed out if there is no EQM2)
EQM2WT	435.	lb	Mission equipment weight (must be zeroed out if there is no EQM2)
DIAMAX	120.	in.	Maximum satellite diameter
ALT	500	nmi	Altitude
<u>Thermal (USRTH)</u>			
ISATOR	1	---	1 earth oriented, 2 sun oriented, 3 inertially oriented
ORBINC	28.5	---	Orbital inclination
<u>Reliability (USRRE)</u>			
KEOPT	1	---	Expense option indicator (1, expense is weight; otherwise expense is cost)
RFIXED	1.0	---	Initial system reliability (mission equipment reliability is set by an interval variable RFNL)



Table 8-1. User Input List (Continued)

<u>FORTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>Reliability (USRRE) (Continued)</u>			
SYSLB	0.0	lb	Initial system weight (should include a estimate of all fixed, e.g., structural, weight)
SLBMX	50000.0	lb	Maximum system weight
ISPT	0	---	Single point failure requirements option (0 = not in effect, otherwise in effect)
ISUB	0	---	Subsystem requirements option (1 = at least one subsystem has a reliability spec, otherwise no reliability specs on subsystems)
SPEC1*	18.	mo	Mean mission duration system requirement
SPEC(1)**	.9	---	R(TRUNC)*** requirement for SANDC subsystem
SPEC(2)**	.9	---	R(TRUNC) requirement for AUXPRO subsystem
SPEC(3)**	.9	---	R(TRUNC) requirement for DPI subsystem
SPEC(4)**	.9	---	R(TRUNC) requirement for COMM subsystem
SPEC(5)**	.9	---	R(TRUNC) requirement for EP subsystem
SPEC(6)**	.6	---	R(TRUNC) requirement for system
<u>Schedules (USRSK)</u>			
SKDME(7, 3)	0	mo	Schedule data for up to three mission equipments: (1) Design engineering cost (\$1000) (2) Test and evaluation cost (\$1000) (3) Development lead time constant (mo) (4) Development lead time variable (mo) (5) Qualification lead time constant (mo) (6) Qualification lead time variable (mo) (7) State-of-art factor (dimensionless)
<u>Structures (USRST)</u>			
CA	10.	g	Axial acceleration
CE	5.	g	Lateral acceleration
<u>Costs (USRCS)</u>			
NFV	4		Number of flight vehicles
NQV	1		Number of qualification vehicles

\*If SPEC 1 ≤ 0.1, MMD MODE is skipped in RELY  
 \*\*If SPEC(K) ≤ 0.00001, R(TRUNC) MODE is skipped for subsystem K in RELY  
 \*\*\*R(TRUNC) = reliability at the end of mission life

Table 8-1. User Input List (Continued)

<u>FORTTRAN Name</u>	<u>Default</u>	<u>Units</u>	<u>Description</u>
<u>Costs (USRCS) (Continued)</u>			
XMER	0.	\$	Mission equipment DDT&E cost
SMEU	0.	\$	Mission equipment average unit cost
FEEPCT	0.07		Contractor's fee percentage
IMETYP	2		Mission equipment type (1 means communications, 2 means Earth Observatory)

```

&MODE
  MICRD=0, IEND6=1, ISTRT3=2, ISTRT2=2, IEND5=2, ISTRT4=2, ISTRT5=2,
&END
&USRSC
  FE=3.5, TSMALI=71.7, TAUX=1.578E10, TAUZ=1.578E10, TAUZ=1.578E10,
  T=60., PHIRX=.393, PHIRY=.393, PHIRZ=.393, OMEGS=.000001,
  OMEGR=58., PJ=71.,
&END
&USRAP
&END
&USRDP
  ARRAYN(1,1)=16., ARRAYN(8,1)=68., ARRAYN(9,1)=16., ARRAYN(10,1)=.0075,
  ARRAYN(11,1)=8., NMSFO=1,
&END
&USRGM
  IOPTCM(1)=1, IMSSEP=1, APOGEE=19322.9, NET=0, NADIR=1,
&END
&USPEP
&END
&USRVS
  EQM1XL=48.4, EQM1YL=108.2, EQM1ZL=108.2, EQM2XL=0., EQM2YL=0., EQM2ZL=0.,
  XCGSA3=2.,
&END
&USPI
  EQM1WT=400., EQM2WT=0., DIAMAX=108., ALT=19322.9,
&END
&USRTH
  ORBINC=0.,
&END
&USRPE
  SLBMX=2650., ISPT=1, SPEC1=38., SPEC(6)=.236, RFIXED=.6,
&END
&USPSK
&END
&USPST
&END
&USRCS
  NFV=6, NQV=1, XMFR=3.23E7, XMEU=3.34E6, FECPCT=.07, IMETYP=1,
&END

```

Figure 8-1. Input Variables for Test Case

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DEFINITIONS - -

<del>CONFIGURATIONS (NCONF)</del>	
<del>STABILIZATION AND CONTROL (NCONF(1))</del>	<del>AUXILIARY PROPULSION (NCONF(2))</del>
<del>NCONF(1)=1 IS DUAL SPIN</del>	<del>NCONF(2)=1 IS COLD GAS</del>
<del>NCONF(1)=2 IS YAW SPIN</del>	<del>NCONF(2)=2 IS MONOPROPELLANT</del>
<del>NCONF(1)=3 IS MASS EXPULSION</del>	<del>NCONF(2)=3 IS BIROPELLANT</del>
<del>NCONF(1)=4 IS MASS EXPULSION W/ CMG-S</del>	<del>COMMUNICATIONS (NCONF(4))</del>
<del>NCONF(1)=5 IS MASS EXPULSION W/ M.W.-S</del>	<del>NCONF(4)=1 IS SEPARATE UPLINK AND DOWNLINK</del>
<del>DATA PROCESSING AND INSTRUMENTATION (NCONF(3))</del>	<del>NCONF(4)=2 IS UNIFIED LINK-COMMON ANTENNA</del>
<del>NCONF(3)=1 IS GENERAL PURPOSE PROCESSOR</del>	<del>NCONF(4)=3 IS UNIFIED LINK-SEPARATE ANTENNA</del>
<del>NCONF(3)=2 IS SPECIAL PURPOSE PROCESSOR</del>	<del>NCONF(4)=4 IS UNIFIED LINK-COMMON ANT + DOWNLINK</del>
<del>ELECTRICAL POWER (NCONF(5))</del>	<del>NCONF(4)=5 IS UNIFIED LINK-SEPARATE ANT + DOWNLINK</del>
<del>NCONF(5)=1 IS SHUNT REGULATION - PADDLE MTD.</del>	<del>VEHICLE SIZING (NCONF(6))</del>
<del>NCONF(5)=2 IS SHUNT REGULATION - BODY MTD.</del>	<del>NCONF(6)=1 IS CYLINDER</del>
<del>NCONF(5)=3 IS SHNT + DISCH.REG - PADDLE MTD.</del>	<del>NCONF(6)=2 IS BOX</del>
<del>NCONF(5)=4 IS SHNT + DISCH.REG. - BODY MTD.</del>	<del>NCONF(6)=3 IS SPHERE</del>
<del>NCONF(5)=5 IS SERIES LOAD REG. - PADDLE MTD.</del>	<del>RELIABILITY</del>
<del>NCONF(5)=6 IS SERIES LOAD REG. - BODY MTD.</del>	<del>REDUNDANCY CONFIGURATION = 0 IS SINGLE STRING</del>
	<del>REDUNDANCY CONFIGURATION = 1 IS DUAL STRING</del>

MESSAGES (IERR)

<del>STABILIZATION AND CONTROL</del>	<del>AUXILIARY PROPULSION</del>
<del>IERR = 0 MEANS NO MESSAGES</del>	<del>IERR = 0 MEANS NO MESSAGES</del>
<del>IERR = 1 MEANS MAX ALLOWABLE SYS. ERROR UNSAT.</del>	<del>IERR = 1 MEANS CYCLE LIFE OF ATTITUDE AND CONTROL</del>
<del>IERR = 1X MEANS MAX RATE ERROR TOO SMALL</del>	<del>THRUSTERS IS TOO SHORT</del>
<del>IERR = 1XX MEANS 3-AXIS WHEELS ACCEPTABLE</del>	<del>IERR = 10 MEANS CYCLE LIFE OF TRANSLATIONAL THRUSTER</del>
<del>IERR = 1XXX MEANS DBL GIMB.CMGs ACCEPTABLE</del>	<del>IS TOO SHORT</del>
<del>DATA PROCESSING AND INSTRUMENTATION</del>	<del>IERR = 11 MEANS CYCLE LIVES OF BOTH THRUSTERS ARE</del>
<del>IERR = 0 MEANS NO MESSAGES</del>	<del>TOO SHORT</del>
<del>IERR = 1 MEANS MUX REQUIRED</del>	<del>THERMAL</del>
<del>IERR = 10 WORD LENGTH GREATER THAN 256</del>	<del>IERR = 1XXXXXXX MEANS BATT RAD AREA IS SUPPLIED</del>
<del>IERR = 100 BIT RATE IS TOO LARGE</del>	<del>IN RADAB</del>
<del>IERR = 1000 SPEC.COMD.SYNC.FLG NE 0</del>	<del>IERR = 1XXXXXXX MEANS OSR CONV. AND VARIABLE COND</del>
<del>IERR = 10000 END OF DATA BASE SENSED</del>	<del>UCTANCE HEAT PIPE INFO IS REQUIRED</del>
<del>VEHICLE SIZING</del>	<del>IERR = 2XXXXXXX MEANS PHASE CONTROL MASS IS</del>
<del>IERR = 0 MEANS NO MESSAGES</del>	<del>SUPPLIED IN PCM</del>
<del>IERR = 1 MEANS BODY MOUNTED SOLAR ARRAY LENGTH</del>	<del>IERR = 3XXXXXXX MEANS ISOTHERMALIZER IS REQUIRED</del>
<del>EXCEEDS EQUIPMENT BAY LENGTH</del>	<del>IERR = 4XXXXXXX MEANS DIODE HEAT PIPE IS REQUIRED</del>
	<del>(2 REQUIRED)</del>
	<del>IERR = 5XXXXXXX MEANS CONV. HEAT PIPE IS REQUIRED</del>
	<del>IERR = 6XXXXXXX MEANS OSR RADIATOR IS REQUIRED</del>
	<del>IERR = 7XXXXXXX MEANS CONV. RADIATOR IS REQUIRED</del>
	<del>IERR = 8XXXXXXX MEANS HEATER POWER IS SUPPLIED</del>
	<del>IN HTRPWR</del>
	<del>IERR = 9XXXXXXX MEANS RADIATOR AREA IS SUPPLIED</del>
	<del>IN RADA</del>

Figure 8-2. Sample Test Case Results

SYSTEM DESCRIPTION -- DESIGN NUMBER 1

STABILIZATION AND CONTROL

CONFIGURATION IDENTIFIER 1

EQUIPMENT CODE IDENTIFIER	101	202	302	401	501	601	701	801	1401
EQUIPMENT QUANTITIES	1	2	3	2	3	3	2	3	3

CALCULATED ACCURACY 0.7500E 00(DEG)

IERR 0

AUXILIARY PROPULSION

CONFIGURATION IDENTIFIER 2

EQUIPMENT CODE IDENTIFIER	607	607	901	1001	499	201	1102	503	701	1201	601
EQUIPMENT QUANTITIES	12	4	7	2	1	7	2	1	1	1	

TOTAL IMPULSE 0.1842E 05(LB-SEC)

IERR 0

DATA PROCESSING AND INSTRUMENTATION

CONFIGURATION IDENTIFIER 2

EQUIPMENT CODE IDENTIFIER 201

EQUIPMENT QUANTITIES 2

COMPUTER OPERATIONS RATE 0.0 (IPS)

IERR 1

COMMUNICATIONS

CONFIGURATION IDENTIFIER 2

EQUIPMENT CODE IDENTIFIER	101	201	301	401	502	601	701	702
EQUIPMENT QUANTITIES	3	2	3	3	3	2	2	2

ENGINEERING DATA RATE 0.1000E 01(KBPS)

MISSION EQUIPMENT DATA RATE 0.0 (KBPS)

ELECTRICAL POWER

CONFIGURATION IDENTIFIER 2

EQUIPMENT CODE IDENTIFIER	101	205	301	1201
EQUIPMENT QUANTITIES	2	6	6	2

TOTAL AVERAGE POWER REQUIREMENT 0.1815E 03(WATTS)

SOLAR ARRAY AREA 0.7567E 02(FT\*\*2)

MINIMUM INSTALLED BATTERY CAP. 0.5697E 01(AMP-HR)

THERMAL CONTROL

RADIATOR AREA	0.4290E 01 (FT**2)	BATTERY RADIATOR AREA	0.1132E 01 (FT**2)
HEATER POWER	0.3066E 03 (BTU/HR)	BATTERY HEATER POWER	0.1100E 03 (BTU/HR)
HEAT PIPE	0.2808E 05 (BTU/HR)	TOTAL HEATER POWER	0.4166E 03 (BTU/HR)
		VARIABLE CONDUCTANCE H.P.	0.2723E 04 (BTU/HR)
		TOTAL HEAT PIPE	0.3081E 05 (BTU/HR)

IERR 1100010111

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Figure 8-2. Sample Test Case Results (Continued)

STRUCTURES			
SKIN THICKNESS	0.0350E-02 (IN)		
STRINGER NO, THICKNESS, HT.	420., 0.1587E-01 (IN),	0.3112E 00 (IN)	
FRAME NO, THICKNESS, HT.	5., 0.6300E-01 (IN),	0.6942E 00 (IN)	
END COVER THICKNESS	FORWARD 0.2857E 00 (IN), CENTER 0.0	(IN), AFT 0.2857E 00 (IN)	
VEHICLE SIZING			
CONFIGURATION IDENTIFIER	1		
LAUNCH WEIGHT, 0.1976E 04 (LBS),	LENGTH 0.8664E 02 (IN),		
WIDTH 0.6197E 02 (IN),	HEIGHT 0.6197E 02 (IN),		
IXX 0.7811E 06 (LB-IN**2),	IYY 0.1365E 07 (LB-IN**2),	IZZ 0.1365E 07 (LB-IN**2)	
IERR	1		
SAFETY,			
REDUNDANCY CONFIGURATION	0		
MEAN MISSION DURATION	0.3922E 02 (MO), RELIABILITY 0.2464E 00,	RELIABILITY TRUNCATION TIME 0.6083E 02 (MO)	
COST (ALL AMOUNTS ARE IN DOLLARS)			
DDT+E		INVESTMENT (RECURRING)	
DESIGN ENGINEERING	8050720.0	UNIT ENGINEERING	2275250.0
TEST AND EVALUATION	5008816.0	UNIT PRODUCTION	2661070.0
TOOLING AND TEST EQUIPMENT	0.0	TOOLING AND TEST EQUIPMENT	0.0
QUALITY CONTROL	821994.9	QUALITY CONTROL	406678.4
SYSTEMS ENGINEERING AND INTEGRATION	3928610.0	SYSTEMS ENGINEERING AND INTEGRATION	1313515.0
PROGRAM MANAGEMENT	1629812.0	PROGRAM MANAGEMENT	485518.8
COST CATEGORY	DDT+E	INVESTMENT	OPERATIONS
SPACECRAFT	19439936.	42852176.	
MISSION EQUIPMENT	32300000.	20040000.	
TOTAL PAYLOAD	51739936.	62892176.	
QUALIFICATION UNITS	7142031.		
G.S.E.	2285763.		
LAUNCH SUPPORT			1653313.
FLIGHT OPERATIONS			744860.
CONTRACTOR FEE	2020739.	2999652.	
PROGRAM TOTAL	63188448.	65891824.	2566043.
SCHEDULE			
DESIGN AND COMPONENT DEVELOPMENT TIME	14.4 (MONTHS)		
SUBSYSTEM DEVELOPMENT TIME	9.4 (MONTHS)		
COMPONENT QUALIFICATION TIME	14.1 (MONTHS)		
SUBSYSTEM QUALIFICATION TIME	8.2 (MONTHS)		
SYSTEM DEVELOPMENT AND FLIGHT READINESS TIME	42.3 (MONTHS)		
SCHEDULE DURATION (TO LAUNCH)	74.3 (MONTHS)		

Figure 8-2. Sample Test Case Results (Continued)

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## 9. SOURCE CODE LISTING

The following is a listing of the Systems Cost/Performance Computer Program.



COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF			
	C	THIS IS THE MAIN DRIVER	00000010
	C	IT SEQUENCES ALL SEGMENTS OF CODING,HANDLES I/O,SETS	00000020
	C	CONFIGURATIONS	00000030
ISN 0002		COMMON /USER1/DPHI,FE,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T, *PHIRX,PHIRY,PHIRZ,PDUTA,PDUTY,PDUTZ,XN,YN,ZN,POUTRX,PDUTRY, *PDOTRZ,OMEGS,OMEGR,PJ,XNN,K,MANV,IPAWAH,EP1,AX,AY,AZ, *FA,EANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDUTAV,PDUTST,PHIFOV,ISAT	00000040
ISN 0003		COMMON /USER2/TTHST,CLIFE	00000050
ISN 0004		COMMON /USER3/BTRMX,SCSFL,TPKFL,DPSMS,ARRAYN(11,3),NMSEQ	00000060
ISN 0005		COMMON /USER4/IOPTCM(3),IMSSEP,ISEQ,LSGLS,LUSB,FREQ(2),APOGEE, * NET,NADIR,FKFQR,COMRAI,BWIDTH(2)	00000070
ISN 0006		COMMON /USER5/IVOLT,OPTMP	00000080
ISN 0007		COMMON /USER6/EQPF,MD12SH,EQM1XL,EQM1YL,EQM1ZL,EQM2XL,EQM2YL, * EQM2ZL,ISBDFG,NUMEQ,EEQWT(9),EEQVL(9),EM1YCG,EM1ZCG,EM2YCG, * EM2ZCG,CGEEX(9),EELOC(9),XCGSA1,XCGSA3	00000090
ISN 0008		COMMON /USER7/ISA1OR,ORBINC	00000100
ISN 0009		COMMON /USER8/SKDMZ(7,3)	00000110
ISN 0010		COMMON /USER9/CA,CE	00000120
ISN 0011		COMMON /ETWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN, * LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCNWT,CONVWT,TKNWT,PASSTR, * SATTWT,IPRIM,IBTLOC,RADA,RADAB,RAT,HTRPWR,HTRPRB, * HPT,HTPIPE,VLHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2), * EQELG,SA60LG,SATWT	00000130
ISN 0012		COMMON /DBCOM/IDB(30),DATAB(55,90)	00000140
ISN 0013		COMMON /USER11/EQM1WT,EQM2WT,DIAMAX,ALT	00000150
ISN 0014		COMMON /USER12/KEOPT,SYSLB,REFIXD,SLBMX,ISPT,SPEC(6),SPEC1,ISUB	00000160
ISN 0015		COMMON /CHLSF/ILHOSE(60),NCHOSE(60),COST(5,60),REL(6,60),THM(4,60) *,DPIA(11,60),SKD(7,60)	00000170
ISN 0016		COMMON /USER13/M+V,NQV,XMER,XMEU,FEETCT,IMETYP	00000180
ISN 0017		COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MMDOLD,TRUNC,ITRUNC,DE,TE, * TOOLR,QCR,SLIR,PMR,PF,PU,IOOLU,QCP,SEIP,PMP,SATR,SATINV,MER, * MEINV,PAYR,PAYINV,PAYQUL,GSE,XLTOI,CTOT,FEER,FEEINV,ODTE,XVEST, * OPS,SKTAU(6),ROLD(60),TTT,AM,TS,BS,AM,TF,BF,TC,TA,TB,TOTOPS	00000190
ISN 0018		DIMENSION NCONF(6),NEQUIP(5),IERR(7),IPIC1(3),IPIC2(9),IPIC3(2), * IPIC4(9),IPIC5(5),ICHOS1(9),ICHOS2(14),ICHOS3(2),ICHOS4(11), * ICHOS5(5),NCHOS1(9),NCHOS2(14),NCHOS3(2),NCHOS4(11),NCHOS5(5)	00000200
ISN 0019		NAMELIST /MODE/MICRU,ISTR1,IEND1,ISTR2,IEND2,ISTR3,IEND3,	00000210
			00000220
			00000230
			00000240
			00000242
			00000245
			00000246
			00000247
			00000248
			00000250
			00000260
			00000270
			00000280

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ISN 0020	*ISTR4,IEND4,ISTR5,IEND5,ISTR6,IEND6,ISTRTR,IENDR NAMELIST/USRSC/DPHI,FE,TSMLL,XMU,PDOTC,TAUX,TAUY,TAUZ,T, *PHIRX,PHIRY,PHIRZ,PDOTX,PDLTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY, *PDOTRZ,OMEGS,OMEGR,PJ,XNN,K,MANV,IPAWAW,LPI,AX,AY,AZ, *EA,EANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV NAMELIST /USRAP/CLIFE	00000290 00000300 00000310 00000320 00000322 00000330
ISN 0021	NAMELIST /USRDP/BTRMX,SCSFL,TPRFL,OPSMS,ARRAYN,HISPD,NMSEQ	00000340
ISN 0022	NAMELIST /USRCM/IOPTCM,IMSSEP,LSGLS,LUSB,FREQ,APOGEE,NET,NADIR, *FREQ,COMRAT,BWIDTH	00000350 00000360
ISN 0023	NAMELIST /USREP/IVOLT,OPTMP	00000370
ISN 0024	NAMELIST /USRTH/ISATOR,ORBINC	00000380
ISN 0025	NAMELIST /USRRE/KEOPT,SYSLE,RFIXED,SLBMX,ISPT,SPEC,SPEC1,ISUB	00000390
ISN 0026	NAMELIST /USRCS/NFV,NQV,XMER,XMEU,FEEPCT,IMETYP	00000392
ISN 0027	NAMELIST/USRVS/EQPF,MD12SH,EQMIXL,EQM1YL,EQM1ZL,EQM2XL,EQM2YL, *EQM2ZL,ISBOFG,NUMEEQ,EEQWT,EEQVL,EM1YCG,EM1ZCG,EM2YCG, *EM2ZCG,CGEEX,EELOC,XCGSA1,XCGSA3	00000400 00000410 00000420
ISN 0028	NAMELIST /USRSK/SKDME	00000425
ISN 0029	NAMELIST /USRST/CA,CE	00000427
ISN 0030	NAMELIST/USRI/EQM1WT,EQM2WT,DIAMAX,ALT	00000430
ISN 0031	DATA NEQUIP,NACCEP/0*0/	00000440
ISN 0032	DATA ISTR1,IEND1,ISTR2,IEND2,ISTR3,IEND3,ISTR4,IEND4,ISTR5, *IEND5,ISTR6,IEND6,ISTRTR,IENDR/1,5,1,3,1,2,1,5,1,6,1,3,0,1/	00000450 00000460
ISN 0033	DATA ITEST1,ITEST2,ITEST3,ITEST4,ITEST5/9,14,2,11,5/	00000470
ISN 0034	READ (5,MODE)	00000480
ISN 0035	READ (5,USRSC)	00000490
ISN 0036	READ (5,USRAP)	00000500
ISN 0037	READ (5,USRDP)	00000510
ISN 0038	READ (5,USRCM)	00000520
ISN 0039	READ (5,USREP)	00000530
ISN 0040	READ (5,USRVS)	00000540
ISN 0041	READ (5,USRI)	00000550
ISN 0042	READ (5,USRTH)	00000560
ISN 0043	READ (5,USRRE)	00000570
ISN 0044	READ (5,USRSK)	00000575
ISN 0045	READ (5,USRST)	00000577
ISN 0046	READ (5,USRCM)	00000578
ISN 0047	TTHST=FE	00000580
ISN 0048	ISEQ=ISATOR	00000590
ISN 0049	IREL=ISTRTR	00000600
ISN 0050		

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ISN 0051		ISAT=ISATOR	00000601
ISN 0052	2	DO 1 I1=ISTR1,IEND1	00000610
ISN 0053		DO 1 I2=ISTR2,IEND2	00000620
ISN 0054		DO 1 I3=ISTR3,IEND3	00000630
ISN 0055		DO 1 I4=ISTR4,IEND4	00000640
ISN 0056		DO 1 I5=ISTR5,IEND5	00000650
ISN 0057		DO 1 I6=ISTR6,IEND6	00000660
ISN 0058		NCONF(1)=I1	00000670
ISN 0059		NCONF(2)=I2	00000680
ISN 0060		NCONF(3)=I3	00000690
ISN 0061		NCONF(6)=I6	00000700
ISN 0062		NCONF(5)=I5	00000710
ISN 0063		NCONF(4)=I4	00000720
ISN 0064		CALL FILTER(NCONF,ICODE)	00000750
ISN 0065		IF (ICODE .LT.0) GO TO 1	00000760
ISN 0067		IPIC1(1)=0	00000770
ISN 0068		IPIC1(2)=0	00000780
ISN 0069		IPIC1(3)=0	00000781
ISN 0070		DO 23 I=1,9	00000790
ISN 0071	23	IPIC2(1)=0	00000800
ISN 0072		IPIC3(1)=0	00000810
ISN 0073		IPIC3(2)=0	00000820
ISN 0074		DO 24 I=1,9	00000830
ISN 0075	24	IPIC4(1)=0	00000840
ISN 0076		DO 20 I=1,5	00000850
ISN 0077	20	IPIC5(1)=0	00000860
ISN 0078	11	CALL INITIL(NCONF,IERR1)	00000870
ISN 0079		IF (IERR1 .EQ. 1) GO TO 1	00000880
ISN 0081		DO 10 ITR=1,2	00000890
ISN 0082		REWIND 1	00000900
ISN 0083		IENDDB=1	00000910
ISN 0084		ITER=ITR-1	00000920
ISN 0085		CALL READDB(IENDDB)	00000930
ISN 0086		IF (ITER .NE. 0 .OR. MICRO .EQ. 1) GO TO 91	00000940
ISN 0088		IPIC1(1)=0	00000950
ISN 0089		IPIC1(2)=0	00000960
ISN 0090		IPIC1(3)=0	00000961
ISN 0091	91	CALL SANDC(IPIC1,IERR(1),ITER,NCONF,ICHOS1,NCHOS1)	00000970
ISN 0092		NEQUIP(1)=0	00001020

ISN 0093		DO 101 I=1, ITEST1	00001030
ISN 0094		IF (ICHOS1(I) .LT. 0 ) GO TO 1	00001050
ISN 0096		IF (ICHOS1(I) .GT. 0) NEQUIP(1)=NEQUIP(1)+1	00001060
ISN 0098	101	CONTINUE	00001070
ISN 0099		NOWAT=1	00001080
ISN 0100		CALL SAVE(ICHOS1, NCHOS1, NOWAT, ITEST1, IENDDB)	00001090
ISN 0101		CALL READDB(IENDDB)	00001100
ISN 0102		IF (ITER .NE. 0 .OR. MICRO .EQ. 2) GO TO 92	00001110
ISN 0104		DO 28 I=1,9	00001120
ISN 0105	28	IPIC2(I)=0	00001130
ISN 0106	92	CALL AUXPRO(IPIC2, IERR(2), ITER, NCONF, ICHOS2, NCHOS2)	00001140
ISN 0107		NEQUIP(2)=0	00001170
ISN 0108		DO 102 I=1, ITEST2	00001180
ISN 0109		IF (ICHOS2(I) .LT. 0 .AND. MICRO .LT. 2) GO TO 13	00001190
ISN 0111		IF (ICHOS2(I) .LT. 0 .AND. MICRO .EQ. 2) GO TO 1	00001200
ISN 0113		IF (ICHOS2(I) .GT. 0) NEQUIP(2)=NEQUIP(2)+1	00001210
ISN 0115	102	CONTINUE	00001220
ISN 0116		CALL SAVE(ICHOS2, NCHOS2, NOWAT, ITEST2, IENDDB)	00001230
ISN 0117		CALL READDB(IENDDB)	00001240
ISN 0118		IF (ITER .NE. 0 .OR. MICRO .EQ. 3) GO TO 93	00001250
ISN 0120		IPIC3(1)=0	00001260
ISN 0121		IPIC3(2)=0	00001270
ISN 0122	93	CALL DPI(IPIC3, IERR(3), ITER, NCONF, ICHOS3, NCHOS3, NOWAT)	00001280
ISN 0123		NEQUIP(3)=0	00001310
ISN 0124		DO 103 I=1, ITEST3	00001320
ISN 0125		IF (ICHOS3(I) .LT. 0 .AND. MICRO .LT. 3) GO TO 13	00001330
ISN 0127		IF (ICHOS3(I) .LT. 0 .AND. MICRO .EQ. 3) GO TO 1	00001340
ISN 0129		IF (ICHOS3(I) .GT. 0) NEQUIP(3)=NEQUIP(3)+1	00001350
ISN 0131	103	CONTINUE	00001360
ISN 0132		CALL SAVE(ICHOS3, NCHOS3, NOWAT, ITEST3, IENDDB)	00001370
ISN 0133		CALL READDB(IENDDB)	00001380
ISN 0134		IF (ITER .NE. 0 .OR. MICRO .EQ. 4) GO TO 94	00001390
ISN 0136		DO 29 I=1,9	00001400
ISN 0137	29	IPIC4(I)=0	00001410
ISN 0138	94	CALL COMM(IPIC4, IERR(4), ITER, NCONF, ICHOS4, NCHOS4)	00001420
ISN 0139		NEQUIP(4)=0	00001450
ISN 0140		DO 104 I=1, ITEST4	00001460
ISN 0141		IF (ICHOS4(I) .LT. 0 .AND. MICRO .LT. 4) GO TO 13	00001470
ISN 0143		IF (ICHOS4(I) .LT. 0 .AND. MICRO .EQ. 4) GO TO 1	00001480

ISN 0145		IF (ICHOS4(I) .GT. 0) NEQUIP(4)=NEQUIP(4)+1	00001490
ISN 0147	104	CONTINUE	00001500
ISN 0148		CALL SAVE(ICHOS4,NCHOS4,NOWAT,ITEST4,IENDDB)	00001510
ISN 0149		CALL READDB(IENDDB)	00001520
ISN 0150		IF (ITER .NE. 0 .OR. MICRO .EQ. 5) GO TO 95	00001530
ISN 0152		DO 21 I=1,5	00001540
ISN 0153	21	IPIC5(I)=0	00001550
ISN 0154	95	CALL EP(IPIC5,IERR(5),ITER,NCONF,ICHOS5,NCHOS5)	00001560
ISN 0155		NEQUIP(5)=0	00001590
ISN 0156		DO 105 I=1,ITEST5	00001600
ISN 0157		IF (ICHOS5(I) .LT. 0 .AND. MICRO .LT. 5) GO TO 13	00001610
ISN 0159		IF (ICHOS5(I) .LT. 0 .AND. MICRO .EQ. 5) GO TO 1	00001620
ISN 0161		IF (ICHOS5(I) .GT. 0) NEQUIP(5)=NEQUIP(5)+1	00001630
ISN 0163		IF (ICHOS5(I)/100 .EQ. 2) IBTLOC=NOWAT-1+I	00001640
ISN 0165	105	CONTINUE	00001650
ISN 0166		CALL SAVE(ICHOS5,NCHOS5,NOWAT,ITEST5,IENDDB)	00001660
ISN 0167		CALL VESIZE(IERR(6),NCONF,ICHOS6)	00001670
ISN 0168		IF (ICHOS6 .LT. 0) GO TO 13	00001680
ISN 0170		IF (ITER .GT. 0) GO TO 10	00001700
ISN 0172		CALL RELY(IRTN,IREL,NEQUIP)	00001720
ISN 0173		PRINT 3000,IRTN	00001721
ISN 0174	3000	FORMAT (5H IRTN,I10)	00001722
ISN 0175		IF (IRTN .LT. 0) GO TO 13	00001730
ISN 0177		IR1=1	00001740
ISN 0178		IR2=NEQUIP(1)	00001750
ISN 0179		DO 31 IR=1,IR2	00001760
ISN 0180	31	NCHOS1(IR)=NCHOSE(IR)	00001770
ISN 0181		IR1=IR2+1	00001780
ISN 0182		IR2=NEQUIP(2)	00001790
ISN 0183		DO 32 IR=1,IR2	00001800
ISN 0184		NCHOS2(IR)=NCHOSE(IR1)	00001810
ISN 0185	32	IR1=IR1+1	00001820
ISN 0186		IR2=NEQUIP(3)	00001830
ISN 0187		DO 33 IR=1,IR2	00001840
ISN 0188		NCHOS3(IR)=NCHOSE(IR1)	00001850
ISN 0189	33	IR1=IR1+1	00001860
ISN 0190		IR2=NEQUIP(4)	00001870
ISN 0191		DO 34 IR=1,IR2	00001880
ISN 0192		NCHOS4(IR)=NCHOSE(IR1)	00001890

ISN 0193	34	IR1=IR1+1	00001900
ISN 0194		IR2=NEQUIP(5)	00001910
ISN 0195		DO 35 IR=1,IR2	00001920
ISN 0196		NCHOS5(IR)=NCHOSF(IR1)	00001930
ISN 0197	35	IR1=IR1+1	00001940
ISN 0198	10	CONTINUE	00001950
ISN 0199		CALL STRUCT(NCONF)	00001955
ISN 0200		CALL THRML(IERR(7),NCONF)	00001960
ISN 0201		NCHOSE(NOWAT)=0	00001980
ISN 0202		CALL COSTS(NCONF,NEQUIP)	00001990
ISN 0203		CALL SKED(NEQUIP,NCONF)	00001993
ISN 0204		NACCEP=NACCEP+1	00001995
ISN 0205		CALL PRNT(IERR,NEQUIP,NACCEP,NCONF)	00002000
ISN 0206	13	IF (MICRO .GT. 0) GO TO 11	00002010
ISN 0208		PRINT 9000,NCONF	00002011
ISN 0209		PRINT 9000,(I CHOSE(J),I=1,NOWAT)	00002012
ISN 0210		PRINT 9000,(NCHOSE(I),I=1,NOWAT)	00002013
ISN 0211	9000	FORMAT (10I10)	00002014
ISN 0212	1	CONTINUE	00002020
ISN 0213		IF (IREL .EQ. IENDR) GO TO 99	00002030
ISN 0215		IREL=IENDR	00002040
ISN 0216		GO TO 2	00002050
ISN 0217	99	STOP	00002060
ISN 0218		END	00002070

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 217 ,PROGRAM SIZE = 5894

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

81K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NUDECK,LOAD,NOMAP,NOEDIT,IO,NOXREF			
ISN 0002		SUBROUTINE FILTER(NCONF,ICODE)	00000010
	C	FILTER CHECKS FOR COMPATIBLE COMBINATIONS OF CONFIGURATIONS	00000020
	C	A MINUS 1 IS RETURNED FOR UNACCEPTABLE COMBINATIONS	00000030
	C	NCONF IS ARRAY OF CONFIGURATIONS	00000040
	C	ICODE IS CODE RETURNED	00000050
ISN 0003		DIMENSION NCONF(6)	00000060
ISN 0004		COMMON /USER1/DPHI,FE,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T	00000070
		* ,PHIRX,PHIRY,PHIRZ,PDOTX,PDOTY,PDOTZ,XN,YN,ZR,PDOTRX,PDOTRY,	00000080
		* PDOTRZ,OMECS,OMEGR,PJ,XNN,K,MANV,IPAYAW,EPI,AX,AY,AZ,	00000090
		* EA,EANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV,ISAT	00000100
ISN 0005		COMMON /USER3/BTRMX,SCSEL,TPRFL,OPSMS,ARRAYN(11,3),NMSEQ	00000110
ISN 0006		COMMON /USER4/IOPTCM(3),IMSSEP,ISEQ,LSGLS,LUSB,FREQ(2),APDGE,NET,	00000120
		* NADIR,FREQR,COMRAT,BWIDTH(2)	00000130
ISN 0007		COMMON /USER5/IVOLT,OPTEMP	00000140
ISN 0008		ICODE=0	00000150
	C	CHECK S AND C	00000160
ISN 0009	10	IF (PDOTRX .LT. .01 .AND. NCONF(1) .EQ. 1) ICODE=-1	00000170
ISN 0011		IF (PDOTRX .LT. .01 .AND. NCONF(1) .EQ. 3) ICODE=-1	00000180
ISN 0013		IF (AMIN1(PHIRX,PHIRY,PHIRZ) .LT. .02 .AND. NCONF(1) .EQ. 2)	00000190
		* ICODE=-1	00000200
	C	MANEUVERABILITY IS MANV AND IS VALUES 1-4	00000210
ISN 0015		IF (MANV .EQ. 4 .AND. NCONF(1) .EQ. 1) ICODE=-1	00000220
	C	PAYLOAD YAW IS 0 OR 1	00000230
ISN 0017		IF (IPAYAW .EQ. 1 .AND. NCONF(1) .NE. 2) ICODE=-1	00000240
ISN 0019		IF (NCONF(1) .EQ. 4 .AND. NCONF(3) .EQ. 2) ICODE=-1	00000250
	C	IOPTCM(1) IS RANGING(1=YES),IOPTCM(2) IS SEPARATE LINK,AND	00000260
	C	IOPTCM(3) IS SEPARATE ANTENNAS	00000270
ISN 0021	40	IF ((IOPTCM(1)+IOPTCM(2)) .GT. 0 .AND. NCONF(4) .EQ. 1) ICODE=-1	00000280
ISN 0023		IF ((IOPTCM(2)+IOPTCM(3)) .GT. 0 .AND. NCONF(4) .EQ. 2) ICODE=-1	00000290
ISN 0025		IF (IOPTCM(2) .GT. 0 .AND. NCONF(4) .LE. 3) ICODE=-1	00000300
ISN 0027		IF (IOPTCM(3) .GT. 0 .AND. NCONF(4) .EQ. 4) ICODE=-1	00000310
ISN 0029		IF (NCONF(4) .LE. 3) GO TO 45	00000330
ISN 0031		DO 43 I=1,11	00000340
ISN 0032		DO 43 J=1,3	00000350
ISN 0033		IF (ARRAYN(I,J) .GT. 0) GO TO 45	00000360
ISN 0035	43	CONTINUE.	00000370
ISN 0036		ICODE=-1	00000380

ISN 0037	45	CONTINUE	00000390
	C	IVOLT=1 MEANS VOLTAGE REGULATED	00000400
ISN 0038	50	IF (IVOLT .EQ. 1 .AND. NCONF(5) .LE. 2) ICODE=-1	00000410
ISN 0040		IF (NCONF(5) .EQ. 1 .AND. NCONF(1) .LT. 3) ICODE=-1	00000420
ISN 0042		IF (NCONF(5) .EQ. 3 .AND. NCONF(1) .LT. 3) ICODE=-1	00000430
ISN 0044		IF (NCONF(5) .EQ. 5 .AND. NCONF(1) .LT. 3) ICODE=-1	00000440
ISN 0046	60	IF (NCONF(6) .EQ. 2 .AND. NCONF(1) .LT. 3) ICODE=-1	00000450
ISN 0048	99	RETURN	00000460
ISN 0049		END	00000470

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,IO,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 48 ,PROGRAM SIZE = 844

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

117K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

ISN 0002		SUBROUTINE READDB (IENDB)	00000480
	C	THIS READS THE DATABASE FOR ONE SUBSYSTEM AT A TIME	00000490
	C	IOB IS SET AS THE DATABASE IS READ BY SCANNING EQUIP NUMBERS	00000500
ISN 0003		DIMENSION STORE(55)	00000510
ISN 0004		COMMON /DBCOM/IDB(30),DATAB(55,90)	00000520
ISN 0005		DATA STORE/55*0./	00000530
ISN 0006		IF (IENDB .LE. 1) GO TO 2	00000540
ISN 0008		IF (STORE(1) .EQ. 0.) GO TO 2	00000550
ISN 0010		DO 1 J=1,55	00000560
ISN 0011	1	DATAB(J,1)=STORE(J)	00000570
ISN 0012		I=2	00000580
ISN 0013		IDOLD=STORE(1)/100.	00000590
ISN 0014		IIDB=1	00000600
ISN 0015		GO TO 3	00000610
ISN 0016	2	I=1	00000620
ISN 0017		IDOLD=0	00000630
ISN 0018		IIDB=1	00000640
ISN 0019	3	READ(1,100,END=40) (DATAB(J,I),J=1,55)	00000650
ISN 0020	100	FORMAT (F5.0,A2,3A6,5E10.0,/,5(8E10.0,/,)5E10.0)	00000660
ISN 0021		IF (IDOLD .EQ. 0) IDOLD=DATAB(1,I)/100.	00000670
ISN 0023		ID=DATAB(1,I)/100.	00000680
	C	TEST FOR END OF SUBSYSTEM	00000690
ISN 0024		IF (IE .LT. IDOLD) GO TO 80	00000700
	C	TEST FOR NEW EQUIP TYPE	00000710
ISN 0026		IF (ID .EQ. IDOLD) GO TO 4	00000720
ISN 0028		IDB(IIDB)=I-1	00000730
ISN 0029		IIDB=IIDB+1	00000740
ISN 0030		IDOLD=ID	00000750
ISN 0031	4	I=I+1	00000760
ISN 0032		GO TO 3	00000770
	C	HERE WHEN SWITCHING SUBSYSTEMS	00000780
ISN 0033	80	DO 5 J=1,55	00000790
ISN 0034	5	STORE(J)=DATAB(J,I)	00000800
ISN 0035		IDB(IIDB)=I-1	00000810
ISN 0036		IENDB=I-1	00000820
ISN 0037		RETURN	00000830
ISN 0038	90	DO 6 J=1,55	00000840

ISN 0039	6 STORE(J)=0.	00000850
ISN 0040	IDB(IIDB)=I-1	00000860
ISN 0041	REWIND 1	00000870
ISN 0042	IENDDB=I-1	00000880
ISN 0043	RETURN	00000890
ISN 0044	END	00000900

\*OPTIONS IN EFFECT\*      NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NGEDIT,ID,NOXREF

\*STATISTICS\*      SOURCE STATEMENTS =      43 ,PROGRAM SIZE =      1042

\*STATISTICS\*      NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

125K BYTES OF CORE NOT USED

ORIGINAL PAGE IS  
OF POOR QUALITY

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF
ISN 0002      SUBROUTINE SAVE(IIN,NIN,NOWAT,ITEST,IENDDB)                00000910
               C THIS SUBROUTINE SAVES ICHOSE,NCHOSE,AND ANY PORTIONS OF 00000920
               C THE DATABASE REQUIRED BY LATER SUBSYSTEMS OR ROUTINES 00000930
ISN 0003      DIMENSION IIN(15),NIN(15)                                00000940
ISN 0004      COMMON /DBCOM/IDB(30),DATAB(55,90)                      00000950
ISN 0005      COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),REL(6,60),THM(4,60) 00000960
               *,DPIA(11,60),SKD(7,60)                                00000970
ISN 0006      DO 1 I=1,ITEST                                          00000980
ISN 0007      IF (IIN(I) .LE. 0) GO TO 1                               00000990
ISN 0009      ICHOSE(NOWAT)=IIN(I)                                    00001000
ISN 0010      NCHOSE(NOWAT)=NIN(I)                                    00001010
ISN 0011      DO 3 J=1,IENDDB                                         00001020
ISN 0012      IF (DATAB(1,J) .NE. IIN(I)) GO TO 3                    00001030
ISN 0014      DO 2 KKK=1,5                                             00001040
ISN 0015      2 COST(KKK,NOWAT)=DATAB(45+KKK,J)                      00001050
ISN 0016      REL(1,NOWAT)=DATAB(23,J)                                00001060
9-12 ISN 0017      DO 4 KKK=2,6                                         00001070
ISN 0018      4 REL(KKK,NOWAT)=DATAB(39+KKK,J)                       00001080
ISN 0019      DO 5 KKK=1,11                                           00001090
ISN 0020      5 DPIA(KKK,NOWAT)=DATAB(29+KKK,J)                      00001100
ISN 0021      THM(1,NOWAT)=DATAB(17,J)                                00001110
ISN 0022      THM(2,NOWAT)=DATAB(18,J)                                00001120
ISN 0023      THM(3,NOWAT)=DATAB(27,J)                                00001130
ISN 0024      THM(4,NOWAT)=DATAB(28,J)                                00001140
ISN 0025      SKD(1,NOWAT)=DATAB(46,J)                                00001150
ISN 0026      SKD(2,NOWAT)=DATAB(47,J)                                00001160
ISN 0027      DO 6 KKK=3,7                                             00001170
ISN 0028      6 SKD(KKK,NOWAT)=DATAB(48+KKK,J)                       00001180
ISN 0029      3 CONTINUE                                              00001190
ISN 0030      NOWAT=NOWAT+1                                           00001200
ISN 0031      1 CONTINUE                                              00001210
ISN 0032      RETURN                                                  00001220
ISN 0033      END                                                    00001230

```

```
*OPTIONS IN EFFECT*      NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,
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```
*OPTIONS IN EFFECT*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF
```

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\*STATISTICS\* SOURCE STATEMENTS = 32 , PROGRAM SIZE = 1076

\*STATISTICS\* NO DIAGNOSTICS GENERATED

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\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

121K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

ISN 0002	SUBROUTINE THRML (ERR,NCONF)	00001790
ISN 0003	COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN, * LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVWT,TKNWT,PASSTR, * SATTWT,TPRIM,IRTLOC,RADA,RADAB,RAT,HTRPWR,HTRPRB, * HPT,HTRPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2), * FQBLG,SAEOLG,SATWT	00001800 00001810 00001820 00001830
ISN 0004	COMMON /USER7/ISATOR,ORBINC	00001831
ISN 0005	COMMON /USER1/EQM1WT,EQM2WT,DIAMAX,ALT	00001840
ISN 0006	COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),REL(6,60), * THRML(4,60),DPIA(11,60),SKD(7,60)	00001850 00001860 00001870
ISN 0007	DIMENSION NCONF(6)	00001880
ISN 0008	REAL LNPTH	00001890
ISN 0009	DATA SIGMA/0.1714E-08/,QS/4+2.0/,EMISS/60.0/,ALBDD/155.0/,CONST/1.00001900 157,PIE/3.1415926535/	00001910 00001920 00001930
9-14	C *****	00001940
	C *****	00001950
	C ** SUBROUTINE THRML USES A METHODOLOGY FOR SIZING THE THERMAL	00001960
	C ** CONTROL SUB-SYSTEM FOR A VARIETY OF SPACECRAFT. THIS METHODOLOGY	00001970
	C ** DETERMINES SIZE AND PERFORMANCE OF THE THERMAL SUB-SYSTEM	00001980
	C *****	00001990
	C ** A GLOSSARY OF VARIABLES FOLLOWS - -	00002000
	C *****	00002010
	C ** CODE IS AS FOLLOWS - -	00002020
	C ** U = USER INPUT, DB = DATA BASE, INT = INTERNAL	00002030
C ** O = OUTPUT, I = INPUT FROM MAIN OR OTHER S/S	00002040	
C *****	00002050	
C ** VAR. NAME CODE UNITS (DEFAULT) DESCRIPTION	00002060	
C **	00002070	
C *****	00002080	
C ** ALBDD INT 155 BTU/(HR*FT**2) ALBEDO	00002090	
C ** ALPHA INT 0.30 (DIMENSIONLESS) CONV.RAD.CONST.	00002100	
C ** 0.06 (DIMENSIONLESS) QSR. RAD.CONST.	00002110	
C **	00002120	
C **	00002130	
C **	00002140	

C **	ALT	U		N.MI.	ALTITUDE	**00002150
C **						**00002160
C **	BV	INT	1.1	VDC	MAX BATT.VOLT.	**00002170
C **						**00002180
C **	CA	INT	0.5	AMPS	BATT TRICKLE	**00002190
C **						**00002200
C **	CONST	INT	1.5		K CONSTANT	**00002210
C **						**00002220
C **	EMISS	INT	60	BTU/(HR*FT**2)	EARTH EMISSION	**00002230
C **						**00002240
C **	EPSLUN	INT	0.75	(DIMENSIONLESS)	CONV.RAD.CONST.	**00002250
C **			0.73	(DIMENSIONLESS)	USR. RAD.CONST.	**00002260
C **						**00002270
C **	ETAT	INT			XMTR EFFICIENCY	**00002280
C **						**00002290
C **	HPT	0			(BTU/HR) TOTAL HEATER POWER	**00002300
C **						**00002310
C **	HPIPE	0			(BTU/HR) HEAT DUE TO H.P.	**00002320
C **						**00002330
C **	HTPT	0			(BTU/HR)TOTAL HEAT PIPE	**00002340
C **						**00002350
C **	HTRPRB	0			(BTU/HR)BATT. HEATER POWER	**00002360
C **						**00002370
C **	HTRPHR	0			(BTU/HR)OTHER HEATER POWER	**00002380
C **						**00002390
C **	I	INT			INDEX	**00002400
C **						**00002410
C **	IBTLOC	I			BATTERY LOCATION	**00002420
C **						**00002430
C **	ICONF	INT			TYPE OF CONFIG.	**00002440
C **	ISATOR	U	1	(DIMENSIONLESS)	EARTH ORIENTED	**00002450
C **			2	(DIMENSIONLESS)	SUN ORIENTED	**00002460
C **			3	(DIMENSIONLESS)	INERTIALLY ORI.	**00002470
C **						**00002480
C **	NC				NUMBER BATT CEL	**00002490
C **						**00002500
C **	NCONF(1)	I			S+C MACRO INDEX	**00002510
C **	NCONF(6)	I			VS MACRO INDEX	**00002520
C **						**00002530

C **	ORBINC	U	DEGREES	ORBIT INCLINAT.	**00002540
C **	PCM	0	KG PHASE CHANGE MASS		**00002550
C **	PIE	INT	3.14159265	CONSTANT	**00002570
C **					00002580
C **					**00002590
C **	PMAX	INT (DB)	WATTS	PWR MAX	**00002600
C **					**00002610
C **	PMIN	INT (DB)	WATTS	PWR MIN	**00002620
C **					**00002630
C **	QMAX	INT	(BTU/HR)	MAX PWR DISSAP.	**00002640
C **					**00002650
C **	QMAXB	INT	(BTU/HR)	BATT.POWER MAXIMUM	**00002660
C **					**00002670
C **	QMIN	INT	(BTU/HR)	MIN PWR DISSAP.	**00002690
C **					**00002700
C **	QMINB	INT	(BTU/HR)	BATT.POWER MINIMUM	**00002710
C **					**00002720
C **	QS	INT	442.0 BTU/(HR*FT**2)	SOLAR CONST.	**00002730
C **					**00002740
C **	RADA	0	(FT**2)	RADIATOR AREA	**00002750
C **					**00002760
C **	RADAB	0	FT**2	BATT.RAD.AREA	**00002770
C **					**00002780
C **	RAT	0	FT**2	TOTAL RAD. AREA	**00002790
C **					**00002800
C **	SATLG	I (VS)	INCHES	SAT. LENGTH	**00002810
C **					**00002820
C **	SATRAD	I (VS)	INCHES	SAT. RADIUS	**00002830
C **					**00002840
C **	SIGMA	INT	0.1714E-8	BTU/(HR*FT2*R4) BOLTZMANN CONST	**00002850
C **					**00002860
C **	THRMD	I		THERMAL DATA BASE	00002870
C **					**00002880
C **	TMAX	INT (DB)	DEGREES R	MAX TEMPERATURE	**00002890
C **					**00002900
C **	TMAXB	INT		BATT. MAX. TEMP.	**00002910
C **					**00002920

C **	TMIN	INT (DB).	DEGREES R	MIN TEMPERATURE	**00002930
C **					**00002940
C **	TMINB	INT	BATT. MIN. TEMP.		**00002950
C **					**00002960
C **	VCHP	0	VAR.COND.HEAT PIPE		**00002970
C **					**00002980
C **					**00002990
C **					**00003000
C	*****				**00003010
C					00003020
C	*****				**00003030
C	*****				**00003040
C *			2		**00003050
C *					**00003060
C *		0	D		**00003070
C *		S	I	I	**00003080
C *		R	S	O	C R
C *		+	G	D	D D H A
C *		V	T	E	S N E D
C *		C	H	R	V A I
C *		H	E	H	H T A
C *		E	P	R	E R R E T
C *		A	C	M	A A A R O
C *		T	M	A	T T D D R
C *		R	L	I	I P
C *		A	P	M	I P P A O A
C *		D	I	A	Z I L T W R
C *		A	P	S	E P P O D E E
C *		B	F	S	R E E R R R A
C *					**00003220
C *	IERR =	X	X	X	X X X X X
C *					**00003230
C *					**00003240
C *	WHERE	0	MEANS	NO	SUCH REQUIREMENT, OR
C *		1	MEANS	WE	HAVE THIS REQUIREMENT
C *					**00003260
C *					**00003270
C	*****				**00003280
C	*****				**00003290
C	*****				**00003300
C *					**00003310



	C		00003320
	C **	INITIALIZATION FOLLOWS = -	00003330
	C		00003340
ISN 0010		RADA=0.	00003350
ISN 0011		RADAB=0.	00003360
ISN 0012		RAT=0.0	00003370
ISN 0013		HTRPWR=0.	00003380
ISN 0014		HTRPRB=0.	00003390
ISN 0015		HPT=0.	00003400
ISN 0016		HTPIPE=0.	00003410
ISN 0017		VCHP=0.	00003420
ISN 0018		HTPT=0.	00003430
ISN 0019		TMAX=1.E+20	00003440
ISN 0020		TMIN=-1.E20	00003450
ISN 0021		PMAX=0.	00003460
ISN 0022		PMIN=0.0	00003470
ISN 0023		ETAT=1.0	00003480
ISN 0024		I=0	00003490
ISN 0025		SATRAD=.5*D	00003500
ISN 0026	10	I=I+1	00003510
	C		00003520
	C	SEARCH FOR MIN(MAX TEMP) AND MAX(MIN TEMP), AND	00003530
	C	ACCUMULATE THE POWER (EXCLUDING XMTRS AND BATTERIES)	00003540
	C		00003550
ISN 0027		IF (ICHOSE(I).LE.0) GO TO 50	00003560
	C		00003570
ISN 0029		IF (1.EQ.IBTLOC) GO TO 20	00003580
	C		00003590
	C		00003600
ISN 0031		TMAX=AMINI(TMAX,THRMD(3,I))	00003610
ISN 0032		TMIN=AMAXI(TMIN,THRMD(4,I))	00003620
ISN 0033		PMIN=THRMD(2,I)+PMIN	00003630
ISN 0034		PMAX=THRMD(1,I)+PMAX	00003640
ISN 0035		GO TO 10	00003650
	C		00003660
	C **	HERE IF WE HAVE THE BATTERY	00003670
	C		00003680
ISN 0036	20	TMINB=THRMD(4,I)+460.	00003690
ISN 0037		TMAXB=THRMD(3,I)+460.	00003700

ISN 0038		GO TO 10	00003710
ISN 0039	50	CONTINUE	00003720
ISN 0040		QMIN=PMIN*3.41	00003730
ISN 0041		IF(PMAX*.5 .GT. PMIN) PMAX=PMAX*.5	00003740
ISN 0043		QMAX=PMAX*3.41	00003750
ISN 0044		TMAX=TMAX+460.	00003760
ISN 0045		TMIN=TMIN+460.	00003770
ISN 0046		ICONF=NCONF(6)	00003780
	C		00003790
ISN 0047		GO TO (60,70,80), ICONF	00003800
	C		00003810
	C **	SATELLITL LENGTH IN INCHES (MUST CONVERT TO CM)(FROM VS)	**00003820
	C	(CYLINDER)	00003830
ISN 0048	60	LNETH=SATLG*2.54*0.75	00003840
ISN 0049		GO TO 90	00003850
	C		00003860
	C	SATELLITE LENGTH IN INCHES (MUST CONVERT TO CM)(FROM VS)	**00003870
	C	(BOX)	00003880
ISN 0050	70	LNETH=SATLG*2.54*0.75	00003890
ISN 0051		GO TO 90	00003900
	C		00003910
	C	SATELLITE LENGTH IN INCHES (MUST CONVERT TO CM)(FROM VS)	**00003920
	C	(SPHERE)	00003930
ISN 0052	80	LNETH=PIE*SATRAD*2.54	00003940
	C		00003950
	C		00003960
ISN 0053	90	CONTINUE	00003970
ISN 0054		IF (ALT.GT.19000.) GO TO 300	00003980
ISN 0056		IF (ALT.LT.500.) GO TO 160	00003990
ISN 0058		GO TO (130,100,100), ISATOR	00004000
ISN 0059	100	ICONF=NCONF(1)	00004010
ISN 0060		GO TO (120,120,110,110,110), ICONF	00004020
	C		00004030
	C **	ORBITS GT 500 BUT LT 19000 AND,	**00004040
	C **	SOLAR ORIENTED AND,	**00004050
	C **	3-AXIS STABILIZED (EQUATION 3.3.1.1)	**00004060
	C		00004070
ISN 0061	110	ALPHA=0.30	00004080
ISN 0062		EPSLON=0.75	00004090

	C		00004100
	C	* DETERMINE RADIATOR AREA	00004110
	C		00004120
ISN 0063		$RADA = QMAX / (\Sigma * EPSLON * TMAX^{**4} - (EMISS * EPSLON))$	00004130
	C		00004140
	C	* DETERMINE HEATER POWER	00004150
	C		00004160
ISN 0064		$HTRPWR = 1.25 * ((\Sigma * EPSLON * RADA * TMIN^{**4}) - (QMIN) - (EMISS * EPSLON))$	00004170
	C		00004180
	C	* DETERMINE HEAT PIPE	00004190
	C		00004200
ISN 0065		$HPIPE = (QMAX * LNGTH) / 3.41$	00004210
ISN 0066		IERR=10111	00004220
ISN 0067		GO TO 380	00004230
	C		00004240
	C **	ORBITS GT 500 BUT LT 19000 AND,	**00004250
	C **	SOLAR ORIENTED AND,	**00004260
	C **	SPIN STABILIZED (EQUATION 3.3.1.2)	**00004270
	C		00004280
9-20 ISN 0068	120	ALPHA=0.3	00004290
ISN 0069		EPSLON=0.75	00004300
	C		00004310
	C	* DETERMINE RADIATOR AREA	00004320
	C		00004330
ISN 0070		$RADA = QMAX / (\Sigma * EPSLON * TMAX^{**4} - (EMISS * EPSLON))$	00004340
	C		00004350
	C	* DETERMINE HEATER POWER	00004360
	C		00004370
ISN 0071		$HTRPWR = 1.25 * ((\Sigma * EPSLON * RADA * TMIN^{**4}) - (QMIN) - (EMISS * EPSLON))$	00004380
	C		00004390
	C	* DETERMINE HEAT PIPE	00004400
	C		00004410
ISN 0072		$HPIPE = ((QMAX * LNGTH) / 3.41)$	00004420
	C		00004430
ISN 0073		IERR=10111	00004440
ISN 0074		GO TO 380	00004450
	C		00004460
ISN 0075	130	ICONF=NCONF(1)	00004470
ISN 0076		GO TO (140,140,150,150,150), ICONF	00004480

	C		00004490
	C **	ORBITS GT 500 BUT LESS THAN 19000 AND,	**00004500
	C **	EARTH ORIENTED AND,	**00004510
	C **	SPIN STABILIZED (EQUATION 3.4.1.2)	**00004520
	C		00004530
ISN 0077	.140	ALPHA=0.08	00004540
ISN 0078		EPSLON=0.73	00004550
	C		00004560
	C	* DETERMINE RADIATOR AREA	00004570
	C		00004580
ISN 0079		RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(QS*ALPHA))	00004590
	C		00004600
	C	* DETERMINE HEATER POWER	00004610
	C		00004620
ISN 0080		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-(QMIN))	00004630
	C		00004640
	C	* DETERMINE PCM	00004650
	C		00004660
ISN 0081		PCM=(0.26*ALPHA*QS*RADA*CONST)/40.	00004670
	C		00004680
	C	* DETERMINE HEAT PIPE	00004690
	C		00004700
9-21 ISN 0082		HTPIPE=(QMAX*LNQTH)/3.41	00004710
	C		00004720
ISN 0083		IERR=10011011	00004730
ISN 0084		GO TO 380	00004740
	C		00004750
	C **	ORBITS GT 500 BUT LESS THAN 19000 AND,	**00004760
	C **	EARTH ORIENTED AND,	**00004770
	C **	3-AXIS STABILIZED (EQUATION 3.4.1.1)	**00004780
	C		00004790
ISN 0085	150	ALPHA=0.08	00004800
ISN 0086		EPSLON=0.73	00004810
	C		00004820
	C	* DETERMINE RADIATOR AREA	00004830
	C		00004840
ISN 0087		RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(QS*ALPHA))	00004850
	C		00004860
	C	* DETERMINE HEATER POWER	00004870

	C		00004880
ISN 0088		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-(QMIN))	00004890
	C		00004900
	C	* DETERMINE PCM	00004910
	C		00004920
ISN 0089		PCM=(0.26*ALPHA*QS*RADA*CONST)/40.	00004930
	C		00004940
	C	* DETERMINE HEAT PIPE	00004950
	C		00004960
ISN 0090		HPIPE=(QMAX*LNPTH)/3.41	00004970
	C		00004980
ISN 0091		IERR=10011011	00004990
ISN 0092		GO TO 380	00005000
	C		00005010
ISN 0093	160	IF (ORBINC.GT.30.) GO TO 230	00005020
	C		00005030
ISN 0095		GO TO (170,200,200), ISATOR	00005040
	C		00005050
ISN 0096	170	ICONF=NCONF(1)	00005060
	C		00005070
ISN 0097		GO TO (180,180,190,190,190), ICONF	00005080
	C		00005090
	C **	ORBIT LT 500, ORBITAL INCLINATION LE 30 DEGREES AND,	**00005100
	C **	EARTH ORIENTED AND,	**00005110
	C **	SPIN STABILIZED (EQUATION 2.1.2.2)	**00005120
	C		00005130
ISN 0098	180	ALPHA=0.08	00005140
ISN 0099		EPSLON=0.73	00005150
	C		00005160
	C	* DETERMINE RADIATOR AREA	00005170
	C		00005180
ISN 0100		RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(EMISS*EPSLON/PIE)-(QS+ALBDD)*ALPHA/PIE)	00005190
			00005200
	C		00005210
	C	* DETERMINE HEATER POWER	00005220
	C		00005230
ISN 0101		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-(QMIN)-((EMISS*EPSLON)/PIE))	00005240
			00005250
	C		00005260

ISN 0102		IERR=1011	00005270
ISN 0103		GO TO 380	00005280
	C		00005290
	C **	ORBIT LT 500, ORBITAL INCLINATION LE 30 DEGREES AND,	**00005300
	C **	EARTH ORIENTED AND,	**00005310
	C **	3-AXIS STABILIZED (EQUATION 2.1.2.1)	**00005320
	C		00005330
ISN 0104	190	ALPHA=0.08	00005340
ISN 0105		EPSLON=0.73	00005350
	C		00005360
	C	* DETERMINE RADIATOR AREA	00005370
	C		00005380
ISN 0106		RADA=GMAX/((SIGMA*EPSLON*TMAX**4)-(ALPHA*QS))	00005390
	C		00005400
	C	DETERMINE HEATER POWER	00005410
	C		00005420
ISN 0107		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN)	00005430
	C		00005440
	C	* DETERMINE PCM MASS	00005450
	C		00005460
ISN 0108		PCM=(0.26*QS*RADA*ALPHA*CONST)/40.	00005470
	C		00005480
	C	* DETERMINE ISOTHERMALIZER HEAT PIPE	00005490
	C		00005500
ISN 0109		HTPIPE=(QMAX*LNPTH)/3.41	00005510
	C		00005520
ISN 0110		IERR=11011011	00005530
ISN 0111		GO TO 380	00005540
	C		00005550
	C		00005560
	C		00005570
ISN 0112	200	ICONF=NCONF(1)	00005580
	C		00005590
ISN 0113		GO TO (210,210,220,220,220), ICONF	00005600
	C		00005610
	C **	ORBIT LT 500, ORBITAL INCLINATION LE 30 DEGREES AND,	**00005620
	C **	SUN ORIENTED AND,	**00005630
	C **	SPIN STABILIZED (EQUATION 2.1.1.2)	**00005640
	C		00005650

ISN 0114	210	ALPHA=0.08	00005660
ISN 0115		EPSLON=0.73	00005670
	C		00005680
	C	* DETERMINE RADIATOR AREA	00005690
	C		00005700
ISN 0116		$RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(EMISS*EPSLON)-(.5*ALBDO*ALPHA))$	00005710
	C		00005720
	C	* DETERMINE HEATER POWER	00005730
	C		00005740
ISN 0117		$HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN)$	00005750
	C		00005760
	C	* DETERMINE HEAT PIPES	00005770
	C		00005780
ISN 0118		$HPIPE=(QMAX*LNPTH)/3.41$	00005790
	C		00005800
ISN 0119		IERR=10011	00005810
ISN 0120		GO TO 380	00005820
	C		00005830
	C **	ORBIT LT 500, UBITAL INCLINATION LE 30 DEGREES AND,	**00005840
	C **	SUN ORIENTED AND,	**00005850
	C **	3-AXIS STABILIZED (EQUATION 2.1.1.1)	**00005860
	C		00005870
ISN 0121	220	ALPHA=0.08	00005880
ISN 0122		EPSLON=0.73	00005890
	C		00005900
	C	* DETERMINE RADIATOR AREA	00005910
	C		00005920
ISN 0123		$RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(EMISS*EPSLON)-(ALBDO*ALPHA))$	00005930
	C		00005940
	C	* DETERMINE HEATER POWER	00005950
	C		00005960
ISN 0124		$HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN)$	00005970
	C		00005980
	C	* DETERMINE HEAT PIPES	00005990
	C		00006000
ISN 0125		$HPIPE=(QMAX*LNPTH)/3.41$	00006010
	C		00006020
ISN 0126		IERR=10011	00006030
ISN 0127		GO TO 380	00006040

2-6

	C		00006050
	C		00006060
	C	HERE IF ORBINC GT 30	00006070
	C		00006080
ISN 0128	C		00006090
	C	230 GO TO (240,270,270), ISATOR	00006100
	C		00006110
ISN 0129	C	240 ICONF=NCONF(1)	00006120
	C		00006130
ISN 0130	C	GO TO (250,250,260,260,260), ICONF	00006140
	C		00006150
	C	** ORBIT LT 500, ORBITAL INCLINATION GT 30 DEGREES AND,	**00006160
	C	** EARTH ORIENTED AND,	**00006170
	C	** SPIN STABILIZED (EQUATION 2.2.3.2)	**00006180
	C		00006190
ISN 0131	C	250 ALPHA=.08	00006200
ISN 0132	C	EPSLON=.73	00006210
	C		00006220
	C	* DETERMINE RADIATOR AREA	00006230
	C		00006240
ISN 0133	C	RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(EMISS*EPSLON/PIE)-((QS+ALBDU)*A00006250 1LPHA/PIE))	00006260
	C		00006270
	C	* DETERMINE HEATER POWER	00006280
	C		00006290
ISN 0134	C	HTRPWK=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN-(EMISS*EPSLON/PIE))	00006300
	C		00006310
ISN 0135	C	IERR=1011	00006320
ISN 0136	C	GO TO 380	00006330
	C		00006340
	C	** ORBIT LT 500, ORBITAL INCLINATION GT 30 AND,	**00006350
	C	** EARTH ORIENTED AND,	**00006360
	C	** 3-AXIS STABILIZED (EQUATION 2.2.3.1)	**00006370
	C		00006380
ISN 0137	C	260 ALPHA=.08	00006390
ISN 0138	C	EPSLON=.73	00006400
	C		00006410
	C	* DETERMINE RADIATOR AREA	00006420
	C		00006430



ISN 0139		RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(ALPHA*QS))	00006440
	C		00006450
	C	* DETERMINE HEATER POWER	00006460
	C		00006470
ISN 0140		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QHIN)	00006480
	C		00006490
	C	* DETERMINE PCM MASS	00006500
	C		00006510
ISN 0141		PCM=(0.26*QS*ALPHA*RADA*CONST)/40.	00006520
	C		00006530
	C	DETERMINE ISOTHERMALIZER HEAT PIPE	00006540
	C		00006550
ISN 0142		HPIPE=(QMAX*LNPTH)/3.41	00006560
	C		00006570
ISN 0143		IERR=11011011	00006580
ISN 0144		GO TO 380	00006590
	C		00006600
	C		00006610
	C		00006620
9-26 ISN 0145	270	ICONF=NCONF(1)	00006630
ISN 0146		GO TO (280,280,290,290,290), ICONF	00006640
	C		00006650
	C	** ORBIT LT 500, ORBITAL INCLINATION GT 30 AND,	**00006660
	C	** SUN ORIENTED AND,	**00006670
	C	** SPIN STABILIZED (EQUATION 2.2.2.2)	**00006680
	C		00006690
ISN 0147	280	ALPHA=.08	00006700
ISN 0148		EPSLON=.73	00006710
	C		00006720
	C	* DETERMINE RADIATOR AREA	00006730
	C		00006740
ISN 0149		RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(EMISS*EPSLON)-(ALBDO*ALPHA))	00006750
	C		00006760
	C	* DETERMINE HEATER POWER	00006770
	C		00006780
ISN 0150		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QHIN-(EMISS*EPSLON))	00006790
	C		00006800
	C	* DETERMINE PCM MASS	00006810
	C		00006820

ISN 0151		PCM=(0.26*ALPHA*ALBDD*RADA*CONST)/40.	00006830
	C		00006840
	C	* DETERMINE HEAT PIPES	00006850
	C		00006860
ISN 0152		HPIPE=(QMAX*LNPTH)/3.41	00006870
	C		00006880
ISN 0153		IERR=10011011	00006890
ISN 0154		GO TO 380	00006900
	C		00006910
	C	** ORBIT LT 500, ORBITAL INCLINATION GT 30 DEGREES	00006920
	C	** SUN ORIENTED AND,	00006930
	C	** 3-AXIS STABILIZED (EQUATION 2.2.2.1)	00006940
	C		00006950
ISN 0155	290	ALPHA=0.08	00006960
ISN 0156		EPSLON=0.73	00006970
	C		00006980
	C	* DETERMINE RADIATOR AREA	00006990
	C		00007000
ISN 0157		RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(EMISS*EPSLON)-(ALBDD*ALPHA))	00007010
	C		00007020
	C	* DETERMINE HEATER POWER	00007030
	C		00007040
9-27 ISN 0158		HTRPWR=1.25*(((SIGMA*EPSLON*RADA*TMIN**4)-QHIN-(EMISS*EPSLON))	00007050
	C		00007060
	C	* DETERMINE PCM MASS	00007070
	C		00007080
ISN 0159		PCM=(0.26*ALPHA*ALBDD*RADA*CONST)/40.	00007090
	C		00007100
	C	* DETERMINE HEAT PIPES	00007110
	C		00007120
ISN 0160		HPIPE=(QMAX*LNPTH)/3.41	00007130
	C		00007140
ISN 0161		IERR=10011011	00007150
ISN 0162		GO TO 380	00007160
	C		00007170
	C	HERE IF ORBIT GT 19000	00007180
	C		00007190
ISN 0163	300	GO TO (340,310,310), ISATOR	00007200
	C		00007210

ISN 0164	310	ICONF=NCONF(1)	00007220
ISN 0165		GO TO (320,320,330,330,330), ICONF	00007230
	C		00007240
	C **	ORBIT GT 19000 AND	**00007250
	C **	SOLAR INERTALLY ORIENTED AND,	**00007260
	C **	SPIN STABILIZED (EQUATION 1.1.1.2)	**00007270
	C		00007280
ISN 0166	320	ALPHA=0.30	00007290
ISN 0167		EPSLON=0.75	00007300
	C		00007310
	C	* DETERMINE RADIATOR AREA	00007320
	C		00007330
ISN 0168		RADA=QMAX/(SIGMA*EPSLON*TMAX**4)	00007340
	C		00007350
	C	* DETERMINE HEATER POWER	00007360
	C		00007370
ISN 0169		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN)	00007380
	C		00007390
	C	* DETERMINE HEAT PIPES	00007400
	C		00007410
9-28 ISN 0170		HTPIPE=(QMAX*LNCTH)/3.41	00007420
	C		00007430
ISN 0171		IERR=10111	00007440
ISN 0172		GO TO 380	00007450
	C		00007460
	C **	ORBIT GT 19000 AND,	**00007470
	C **	SOLAR INERTIALLY ORIENTED AND	**00007480
	C **	3-AXIS STABILIZED (EQUATION 1.1.2)	**00007490
	C		00007500
ISN 0173	330	ALPHA=0.30	00007510
ISN 0174		EPSLON=0.75	00007520
	C		00007530
	C	* DETERMINE RADIATOR AREA	00007540
	C		00007550
ISN 0175		RADA=(2.*QMAX)/(SIGMA*EPSLON*TMAX**4)	00007560
	C		00007570
	C	* DETERMINE HEATER POWER	00007580
	C		00007590
ISN 0176		HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4/2.)-QMIN)	00007600

	C		00007610
	C	* DETERMINE DIODE HEAT PIPE (2 REG-D)	00007620
	C		00007630
ISN 0177	C	HTPIPE=(QMAX*LNPTH)/3.41	00007640
ISN 0178	C	IERR=110111	00007650
ISN 0179	C	GO TO 380	00007660
	C		00007670
	C		00007680
	C		00007690
ISN 0180	340	ICONF=NCONF(1)	00007700
ISN 0181	C	GO TO (350,360,370,370,360), ICONF	00007710
	C		00007720
	C		00007730
	C **	ORBIT GT 19000 AND,	**00007740
	C **	EARTH ORIENTED AND,	**00007750
	C **	DUAL OR NORMAL SPIK STABILIZED(EQUATION 1.2.3)	**00007760
	C		00007770
ISN 0182	350	ALPHA=0.30	00007780
ISN 0183	C	EPSLON=0.75	00007790
	C		00007800
	C	* DETERMINE RADIATOR AREA	00007810
ISN 0184	C	RADA=QMAX/(SIGMA*EPSLON*TMAX**4)	00007820
	C		00007830
	C	* DETERMINE HEATER POWER	00007840
	C		00007850
ISN 0185	C	HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN)	00007860
	C		00007870
	C		00007880
	C	* DETERMINE HEAT PIPES	00007890
	C		00007900
ISN 0186	C	HTPIPE=(QMAX*LNPTH)/3.41	00007910
	C		00007920
ISN 0187	C	IERR=10111	00007930
ISN 0188	C	GO TO 380	00007940
	C		00007950
	C **	ORBIT GT 19000 AND	**00007960
	C **	YAW SPIN STABILIZED (EQUATION 1.2.2)	**00007970
	C		00007980
ISN 0189	360	ALPHA=0.08	00007990

ISN 0190		EPSLON=0.73	00008000
	C		00008010
	C	* DETERMINE RADIATOR AREA	00008020
	C		00008030
ISN 0191		$RADA=QMAX/((SIGMA*EPSLON*TMAX**4)-(QS*ALPHA/PIE))$	00008040
	C		00008050
	C	* DETERMINE HEATER POWER.	00008060
	C		00008070
ISN 0192		$HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4)-QMIN)$	00008080
	C		00008090
ISN 0193		IERR=1011	00008100
ISN 0194		GO TO 380	00008110
	C		00008120
	C	** ORBIT AT 19000 AND,	**00008130
	C	** EARTH ORIENTED AND,	**00008140
	C	** 3-AXIS STABILIZED (EQUATION 1.2.1)	**00008150
	C		00008160
ISN 0195	370	ALPHA=0.30	00008170
ISN 0196		EPSLON=0.75	00008180
	C		00008190
	C	* DETERMINE RADIATOR AREA	00008200
	C		00008210
ISN 0197		$RADA=(2.*QMAX)/(SIGMA*EPSLON*TMAX**4)$	00008220
	C		00008230
	C	* DETERMINE HEATER POWER	00008240
	C		00008250
ISN 0198		$HTRPWR=1.25*((SIGMA*EPSLON*RADA*TMIN**4/2.)-QMIN)$	00008260
	C		00008270
	C	* DETERMINE DIODE HEAT PIPE (2 REG-D)	00008280
	C		00008290
ISN 0199		$HPIPE=(QMAX*LNPTH)/3.41$	00008300
	C		00008310
ISN 0200		IERR=110111	00008320
ISN 0201		GO TO 380	00008330
	C		00008340
	C	*** HERE WE WILL SIZE THE BATTERY THERMAL CONTROL NETWORK	00008350
	C	***	00008360
	C	***	00008370
	C		00008380

ISN 0202	380	CA=.5	00008390
ISN 0203		BV=1.5	00008400
ISN 0204		ALPHA=0.08	00008410
ISN 0205		EPSLON=0.73	00008420
ISN 0206		QMAXB=NC*CA*BV*3.41	00008430
ISN 0207		QMINB=0.	00008440
	C		00008450
	C	* DETERMINE RADIATOR AREA FOR BATTERY	00008460
	C		00008470
ISN 0208		RADAB=QMAXB/((SIGMA*EPSLON*(TMAXB-30.)**4)-(QS*ALPHA))	00008480
	C		00008490
	C	* DETERMINE HEATER POWER FOR BATTERY	00008500
	C		00008510
	C		00008520
ISN 0209		HTRPRB=1.25*(SIGMA*EPSLON*RADAB*(TMINB)**4-QMINB)	00008530
	C		00008540
	C	* DETERMINE VARIABLE CONDUCTANCE HEAT PIPE	00008550
	C		00008560
ISN 0210		VCHP=QMAXB*LN6TH/3.41	00008570
ISN 0211		IERR=IERR+1100000000	00008580
	C		00008590
	C		00008600
	C		00008610
9-31 ISN 0212		RAT=RADA+RADAB	00008620
ISN 0213		HPT=HTRPWR+HTRPRB	00008630
ISN 0214		HTPT=HTPIPE+VCHP	00008640
	C		00008650
	C		00008660
ISN 0215		RETURN	00008670
	C		00008680
ISN 0216		END	00008690

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBODIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 215 ,PROGRAM SIZE = 3900

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

93K BYTES OF CORE NOT USED

COMPILER OPTIONS -- NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF		
ISN 0002	SUBROUTINE COMM (IPIC,IERR,ITER,MCONF,ICHOSE,NCHOSE)	00008700
ISN 0003	INTEGER RESET,SEO,SSS,GRP	00008710
ISN 0004	REAL LMARG,NF,MODLOS,IBER	00008711
ISN 0005	DIMENSION IPIC(9),ICHOSE(11),NCHOSE(11),KPIC(9),MCONF(6), * KCHOSE(11)	00008720 00008721
ISN 0006	DIMENSION SIGNOI(2),LMARG(2),TCLOSS(2),GT(2),MODX(2)	00008730
ISN 0007	DIMENSION BER(14,3),IBER(14),BESSJ(2),LIMPIC(9)	00008731
ISN 0008	COMMON /USER4/IUPTCM(3),IMSSEP,SEO,LSGLS,LUSB,FREQX(2),APOGEE, * NET,NADIR,FREQR,COMRAT,BWIDTH(2)	00008740 00008750
ISN 0009	COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN, * LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVWT,TKNWT,PASSTR, * SATTWT,TPRIM,IBTLOC,RADA,RADAB,RAT,HTRPWR,HTRPRB, * HPT,HTPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2), * EQBLG,SABOLG,SATWT	00008760 00008770 00008780 00008790 00008791
ISN 0010	COMMON /DBCOM/IDB(30),DATAB(55,90)	00008800
ISN 0011	COMMON /USER1/EQM1WT,EQM2WT,DIAMAX,ALT	00008810
ISN 0012	EQUIVALENCE (J1,KPIC(1)), (J7,KPIC(6)), (J4,KPIC(7)), (J5,KPIC(8)) 1, (J6,KPIC(9))	00008820 00008830
ISN 0013	INTEGER SEO,SSS,GRP	00008840
ISN 0014	DATA SIGNOI /10.,10./, LMARG /6.,6./, SLANT /-1.E10/, * GTOF /-1.E10/, GR/-1.E10/, T/-1.E10/, NF /-1.E10/, * TCLOSS / 0.,0./, POLOSS /0./, GAMMA /.1/, BFTA /1.8/, * GT /-1.E10,-1.E10/, MODX /0,0/, ANTLOS /0./, * COVER /0./,GRP /0/	00008860 00008870 00008880 00008890 00008900
	C BER IS BIT ERROR RATE DEGRADATION DUE TO HARDWARE	00008910
	C IBER IS ARRAY OF DATA RATES	00008920
ISN 0015	DATA IBER/.25,.50,1.0,2.0,4.0,8.0,16.,32.,64.,128.,256.,512.,768., 11024./	00008950 00008960
ISN 0016	DATA BER/8*4.4,4.6,5*5.5,8*2.4,2.4,2.5,4*3.3,10*4.0,3.9, 13.3,3.4,4.1/	00008970 00008980
ISN 0017	DATA IB1/6/,IB2/9/,IB3/11/,IA1/10/,IT1/11/,IT2/6/,IT3/12/,IT4/13/, 1IT5/11/,IT6/14/,IT7/9/,IT8/8/,IT9/10/,IT10/15/,IR1/6/,IR2/10/,IR3/100 25/,IC1/7/,IC2/6/,IC3/12/,ID1/6/,ID2/11/	00008990 00009000 00009010
ISN 0018	IF (ITER .GT. 0) GO TO 3	00009040
ISN 0020	DO 2 I=1,11	00009050
ISN 0021	2 NCHOSE(I)=1	00009060
ISN 0022	3 IF (ITER .EQ. 0 .AND. IPIC(4) .EQ. 0) IC=0	00009070



ISN 0024		NCONF = MCONF(+)	00009080
ISN 0025		DO 1 I=1,2	00009090
ISN 0026		1 BITRAT(I) = .001 * BITRAT(I)	00009100
ISN 0027		SSS=0	00009110
ISN 0028		IF (MCONF(1) .EQ. 1 .OR. MCONF(1) .EQ. 2) SSS=1	00009120
ISN 0030		INX=1	00009130
ISN 0031		IF (NCONF.EQ.4.OR.NCONF.EQ.5) INX=2	00009140
		C INITIALIZATION OF IPIC AND ICHOSE	
ISN 0033		ICC=IC+1	00009150
ISN 0034		IF (ITER.NE.0) ICC=1	00009170
ISN 0036		DO 10 I=ICC,9	00009180
ISN 0037	10	KCHOSE(I)=0	00009190
ISN 0038		DO 20 I=1,9	00009200
ISN 0039		KPIC(I)=IPIC(I)	00009210
ISN 0040	20	IF (ITER.EQ.0.AND.IPIC(1).EQ.0) KPIC(I)=RESET(I)	00009220
ISN 0042		F1=0.	00009230
ISN 0043		IF (NCONF .EQ. 2 .OR. NCONF .EQ. 4) F1=1.	00009240
ISN 0045		IF (F1 .EQ. 0.) KPIC(9)=0	00009250
ISN 0047		IF (F1 .EQ. 1.) KPIC(6)=0	00009260
ISN 0049		IF (ITER.NE.0) IC=0	00009270
ISN 0051		IF (IC.NE.0) GO TO 700	00009280
ISN 0053		LIMPIC(1)=IDB(1)	00009290
ISN 0054		LIMPIC(2)=IDB(2)	00009300
ISN 0055		LIMPIC(3)=IDB(2)	00009310
ISN 0056		LIMPIC(4)=IDB(3)	00009320
ISN 0057		LIMPIC(5)=IDB(3)	00009330
ISN 0058		LIMPIC(6)=IDB(2)	00009340
ISN 0059		LIMPIC(7)=IDB(4)	00009350
ISN 0060		LIMPIC(8)=IDB(5)	00009360
ISN 0061		LIMPIC(9)=IDB(6)	00009370
ISN 0062		CALL BESS (BETA,BESSJ,1)	00009380
ISN 0063	30	CONTINUE	00009390
ISN 0064		IF (NCONF.GE.4.OR.BITRAT(2).EQ.0) GO TO 40	00009400
ISN 0066		BITRAT(1)=(BITRAT(1)+BITRAT(2))*1.3	00009410
ISN 0067	40	CONTINUE	00009420
ISN 0068		RATE1=IBER(1)	00009430
ISN 0069		RATE2=0	00009440
ISN 0070		DO 50 I=1,13	00009450
ISN 0071		IF (BITRAT(1).GT.IBER(I)) RATE1=IBER(I+1)	00009460

ISN 0073	50	IF (BITRAT(2).GT.IBER(I)) RATE2=IBER(I+1)	00009470
ISN 0075		BITRAT(1)=RATE1	00009480
ISN 0076		BITRAT(2)=RATE2	00009490
ISN 0077		IF (NCONF.EQ.1) GO TO 90	00009500
ISN 0079		ILRR=1	00009510
ISN 0080		IF (LSGLS.EQ.0) GO TO 770	00009520
		C SGLS BBAU SELECTED *****	00009530
ISN 0082		IERR=0	00009540
ISN 0083		IC=1	00009550
		C ONE HOUSKEEPING BIT STREAM ONLY (THIS SEMESTER)	00009560
		C 1 IS SGLS 2 IS USB	00009570
ISN 0084	60	IF (DATAB(IB1,J1).EQ.1) GO TO 70	00009580
ISN 0086		J1=J1+1	00009590
ISN 0087		IF (J1.GT.IDB(1)) GO TO 760	00009600
ISN 0089		GO TO 60	00009610
ISN 0090	70	IF (BITRAT(1).GT. 128.) GO TO 80	00009620
ISN 0092		IF (ABS(DATAB(IB2,J1)-1.024) .LT. .01) GO TO 690	00009630
ISN 0094		J1=J1+1	00009640
ISN 0095		IF (J1.GT.IDB(1)) GO TO 760	00009650
ISN 0097		GO TO 60	00009660
ISN 0098	80	IERR=2	00009670
ISN 0099		IF (BITRAT(1).NE.256) GO TO 770	00009680
ISN 0101		IERR=0	00009690
ISN 0102		IF (DATAB(IB2,J1).EQ.1.7) GO TO 690	00009700
ISN 0104		J1=J1+1	00009710
ISN 0105		IF (J1.GT.IDB(1)) GO TO 760	00009720
ISN 0107		GO TO 60	00009730
		C END OF BBAU SELECTION	00009740
ISN 0108	90	IC=2	00009750
ISN 0109		KXMTR=1	00009760
ISN 0110		GO TO 110	00009770
ISN 0111	100	IC=3	00009780
ISN 0112		KXMTR=2	00009790
ISN 0113	110	CONTINUE	00009800
		C	00009810
		C ANTENNA SELECTION *****	00009820
ISN 0114		J2=KPIC(IC)	00009830
ISN 0115		IF (SEQ.EQ.0) GO TO 250	00009840
ISN 0117		IF (SSS.EQ.0) GO TO 160	00009850

ISN 0119		IF (ALT.GT.12000) GO TO 140	00009860
		C OMNI (B OMNI)	00009870
ISN 0121	120	IF (DATA(IA1,J2).EQ.11) GO TO 130	00009880
ISN 0123		J2=J2+1	00009890
ISN 0124		IF (J2.GT.IDB(2)) GO TO 760	00009900
ISN 0126		GO TO 120	00009910
ISN 0127	130	IF (GT(KXMTR).NE.-1.E+10) GO TO 690	00009920
ISN 0129		GT(KXMTR)=-9.	00009930
ISN 0130		IF (COVER.EQ.0) GO TO 690	00009940
ISN 0132		GT(KXMTR)=-5.	00009950
ISN 0133		IF (COVER.EQ.55.) GT(KXMTR)=-13.	00009960
ISN 0135		GO TO 690	00009970
ISN 0136	140	IERR=30	00009980
ISN 0137		IF (ALT.GT.19323) GO TO 770	00009990
ISN 0139		IERR=0	00010000
ISN 0140		IF (GT(KXMTR).NE.-1.E+10) GO TO 150	00010010
ISN 0142		GT(KXMTR)=2.	00010020
		C BICONICAL (A)	00010030
ISN 0143	150	IF (DATA(IA1,J2).EQ.21) GO TO 690	00010040
ISN 0145		J2=J2+1	00010050
ISN 0146		IF (J2.GT.IDB(2)) GO TO 760	00010060
ISN 0148		GO TO 150	00010070
ISN 0149	160	IF (ALT.GT.7000) GO TO 210	00010080
ISN 0151		IF (NADJR.EQ.0) GO TO 190	00010090
ISN 0153	170	IF (GT(KXMTR).NE.-1.E+10) GO TO 180	00010100
ISN 0155		GT(KXMTR)=-1.	00010110
		C CONICAL SPIRAL (F2)	00010120
ISN 0156	180	IF (DATA(IA1,J2).EQ.41) GO TO 690	00010130
ISN 0158		J2=J2+1	00010140
ISN 0159		IF (J2.GT.IDB(2)) GO TO 760	00010150
ISN 0161		GO TO 170	00010160
ISN 0162	190	IF (GRP.EQ.0) GO TO 170	00010170
ISN 0164		IF (GT(KXMTR).NE.-1.E+10) GO TO 200	00010180
ISN 0166		GT(KXMTR)=2.	00010190
		C MONOPOLE (F1)	00010200
ISN 0167	200	IF (DATA(IA1,J2).EQ.51) GO TO 690	00010210
ISN 0169		J2=J2+1	00010220
ISN 0170		IF (J2.GT.IDB(2)) GO TO 760	00010230
ISN 0172		GO TO 200	00010240

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ISN 0173	210	IF (ALT.GT.12000.) GO TO 230	00010250
	C		00010260
ISN 0175		IF (GT(KXMTR).NE.-1.E+10) GO TO 220	00010270
ISN 0177		GT(KXMTR)=10.	00010280
	C HELIX (F3)		00010290
ISN 0178	220	IF (DATAB(1A1,J2).EQ.31) GO TO 690	00010300
ISN 0180		J2=J2+1	00010310
ISN 0181		IF (J2.GT.1DB(2)) GO TO 760	00010320
ISN 0183		GO TO 220	00010330
ISN 0184	230	IERR=30	00010340
ISN 0185		IF (ALT.GT.19323) GO TO 770	00010350
ISN 0187		IERR=0	00010360
	C		00010370
ISN 0188		IF (GT(KXMTR).NE.-1.E+10) GO TO 240	00010380
ISN 0190		GT(KXMTR)=15.	00010390
	C PARABOLA (B HIGH GAIN)		00010400
ISN 0191	240	IF (DATAB(1A1,J2).EQ.1) GO TO 690	00010410
ISN 0193		J2=J2+1	00010420
ISN 0194		IF (J2.GT.1DB(2)) GO TO 760	00010430
ISN 0196		GO TO 240	00010440
	C		00010450
	C STEERABLE PARABOLA OPTION WILL BE INCLUDED NEXT SEMESTER		00010460
9-37 ISN 0197	250	IF (ALT.LE.12000) GO TO 120	00010470
ISN 0199		IF (BITRAT(KXMTR).GT.10) GO TO 120	00010480
ISN 0201		GO TO 120	00010490
ISN 0202	260	KXMTR=1	00010500
ISN 0203		GO TO 280	00010510
ISN 0204	270	KXMTR=2	00010520
ISN 0205	280	CONTINUE	00010530
ISN 0206		LUNI=0	00010540
ISN 0207		IF (INCONF.GT.1.AND.KXMTR.EQ.1) LUNI=1	00010550
	C		00010560
	C SPACE LOSS		00010570
ISN 0209		IF (SLANT.EQ.-1.E+10) SLANT=SQRT(APOGEE*(APOGEE+6880))	00010580
ISN 0211		SLOSS=37.8+20*ALOG10(FREQX(KXMTR)*SLANT)	00010590
	C		00010600
	C G TO T		00010610
ISN 0212		IF (GTOT.NE.-1.E+10) GO TO 320	00010620
ISN 0214		IF (GR.NE.-1.E+10.AND.T.NE.-1.E+10) GO TO 310	00010630

ISN 0216		IF (NF.NE.-1.E+10.AND.GR.NE.-1.E+10) GO TO 300	00010640
		C NET.EQ.0 FOR AFSCF NET.NE.0 FOR NASA	00010650
ISN 0218		IF (NET.EQ.0) GO TO 290	00010660
ISN 0220		GR=44	00010670
ISN 0221		T=170	00010680
ISN 0222		GO TO 310	00010690
ISN 0223	290	GR=47.5	00010700
ISN 0224		T=220	00010710
ISN 0225		GO TO 310	00010720
ISN 0226	300	T=(10.**((NF/10)-1))*290.	00010730
ISN 0227	310	GTOT=GR-10*ALOG10(T)	00010740
ISN 0228	320	CONTINUE	00010750
		C	00010760
		C TRANSMITTER CIRCUIT LOSS	00010770
ISN 0229		IF (TCLOSS(KXMTR).NE.0) GO TO 330	00010780
ISN 0231		TCLOSS(KXMTR)=1.0	00010790
ISN 0232		IF (LUNI.EQ.1.AND.(NCONF.EQ.2.OR.NCONF.EQ.4)) TCLOSS(KXMTR)=1.5	00010800
ISN 0234	330	CONTINUE	00010810
		C	00010820
		C MODULATION LOSS	00010830
ISN 0235		MODLOS=0	00010840
ISN 0236		IF (LUNI.EQ.0) GO TO 340	00010850
ISN 0238		IERR=10	00010860
ISN 0239		IF (LSGLS.EQ.0) GO TO 770	00010870
ISN 0241		IERR=0	00010880
		C BESSJ(2)=J1(BETA) / BLESSJ(1)=J0(BETA)	00010890
ISN 0242		MODLOS=ABS(10*ALOG10(2*(BESSJ(2)*COS(GAMMA))**2))	00010900
ISN 0243	340	CONTINUE	00010910
		C HARDWARE DEGRDATION LOSS	00010920
ISN 0244		IF (LUNI.EQ.1) GO TO 360	00010930
ISN 0246		DO 350 I=1,14	00010940
ISN 0247	350	IF (BITRAT(KXMTR).EQ.1BER(I)) HDLOSS=BER(I,3)	00010950
ISN 0249		GO TO 380	00010960
ISN 0250	360	IERR=10	00010970
ISN 0251		IF (LSGLS.EQ.0) GO TO 770	00010980
ISN 0253		IERR=0	00010990
ISN 0254		IK=2	00011000
ISN 0255		IF (DATAB(IB2,J1).EQ.1.024) IK=1	00011010
ISN 0257		DO 370 I=1,14	00011020

ISN 0258	370	IF (BITRAT(I).EQ.1BER(J)) HDLOSS=6ER(I,K)	00011030
		C BANDWIDTH IN DB	00011040
ISN 0260	380	IF (BWIDTH(KXMTR).LE.-1.E+10) BWIDTH(KXMTR)=BITRAT(KXMTR)*1000	00011050
ISN 0262		B=10*ALOG10(BWIDTH(KXMTR))	00011060
		C	00011070
		C CALCULATION OF ERP	00011080
ISN 0263		ERP=SIGNDI(KXMTR)+SLOSS+B-GTOT+LMARG(KXMTR)+TCLOSS(KXMTR)+PULOSS+A00011090	00011090
		INTLOS+MODLOS+HDLOSS-228.6	00011100
ISN 0264		PW=10.*((ERP-GT(KXMTR))/10)	00011110
		C	00011120
		C TRANSMITTER SELECTION *****	00011130
ISN 0265		KNSTRA=0	00011140
ISN 0266		IC=KXMTR+3	00011150
ISN 0267		J3=KPIC(IC)	00011160
ISN 0268	390	IF (LUNI.EQ.0) GO TO 440	00011170
ISN 0270	400	IF (DATAB(IT1,J3).EQ.1) GO TO 410	00011180
ISN 0272		J3=J3+1	00011190
ISN 0273		IF (J3.GT.IDB(3)) GO TO 760	00011200
ISN 0275		GO TO 400	00011210
ISN 0276	410	IF (DATAB(IB3,J1).EQ.0) GO TO 420	00011220
ISN 0278		KNSTRA=1	00011230
ISN 0279		IF (DATAB(IB3,J1).EQ.DATAB(I,J3)) GO TO 460	00011240
ISN 0281		J3=J3+1	00011250
ISN 0282		IF (J3.GT.IDB(3)) GO TO 760	00011260
ISN 0284		GO TO 400	00011270
ISN 0285	420	IF (DATAB(IT2,J3).EQ.0) GO TO 430	00011280
ISN 0287		J3=J3+1	00011290
ISN 0288		IF (J3.GT.IDB(3)) GO TO 760	00011300
ISN 0290		GO TO 400	00011310
ISN 0291	430	IF (DATAB(IB2,J1).EQ.DATAB(IT3,J3).OR.DATAB(IB2,J1).EQ.DATAB(IT4,J3).OR.DATAB(IT5,J3).OR.DATAB(IT6,J3).OR.DATAB(IT7,J3).OR.DATAB(IT8,J3).OR.DATAB(IT9,J3).OR.DATAB(IT10,J3).OR.DATAB(IT11,J3).OR.DATAB(IT12,J3).OR.DATAB(IT13,J3)) GO TO 460	00011320
ISN 0293		J3=J3+1	00011330
ISN 0294		IF (J3.GT.IDB(3)) GO TO 760	00011340
ISN 0296		GO TO 400	00011350
ISN 0297	440	CONTINUE	00011370
		C NON UNIFIED TRANSMITTER	00011380
ISN 0298	450	CONTINUE	00011390
ISN 0299		IF (BITRAT(KXMTR)/1000.LE.DATAB(IT6,J3)) GO TO 460	00011400
ISN 0301		J3=J3+1	00011410

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ISN 0302		IF (J3.GT.IDB(3)) GO TO 760	00011420
ISN 0304		GO TO 450	00011430
ISN 0305	460	IF (LSGLS.EQ.0) GO TO 470	00011440
ISN 0307		IF (DATAB(IT5,J3).EQ.1) GO TO 470	00011450
ISN 0309		J3=J3+1	00011460
ISN 0310		IF (J3.GT.IDB(3)) GO TO 760	00011470
ISN 0312		GO TO 440	00011480
		C FREQUENCY,POWER,AND MODULATION COMPATIBILITY	00011490
ISN 0313	470	IF (FREQX(KXMTR).GE.DATAB(IT7,J3).AND.FREQX(KXMTR).LE.DATAB(IT8,J3))	00011500
		1)) GO TO 480	00011510
ISN 0315		J3=J3+1	00011520
ISN 0316		IF (J3.GT.IDB(3)) GO TO 760	00011530
ISN 0318		GO TO 390	00011540
ISN 0319	480	IF (PW.LE.DATAB(IT9,J3)) GO TO 490	00011550
ISN 0321		J3=J3+1	00011560
ISN 0322		IF (J3.GT.IDB(3)) GO TO 760	00011570
ISN 0324		GO TO 390	00011580
		C MODULATION PHASE=1 ,FREQUENCY=2, AMPLITUDE=3	00011590
ISN 0325	490	IF (LSGLS.EQ.1) MODX(KXMTR)=1	00011600
ISN 0327		IF (MODX(KXMTR).EQ.0) GO TO 500	00011610
ISN 0329		IF (MODX(KXMTR).EQ.DATAB(IT10,J3)) GO TO 500	00011620
ISN 0331		J3=J3+1	00011630
ISN 0332		IF (J3.GT.IDB(3)) GO TO 760	00011640
ISN 0334		GO TO 390	00011650
ISN 0335	500	GO TO 690	00011660
ISN 0336	510	CONTINUE	00011670
		C	00011680
		C RECEIVING ANTENNA SELECTION *****	00011690
ISN 0337		IC=6	00011700
ISN 0338		IF (F1 .EQ. 1.) GO TO 690	00011710
ISN 0340		IF (SEQ.EQ.0) GO TO 520	00011720
ISN 0342		IF (SSS.EQ.C) GO TO 530	00011730
ISN 0344	520	IF (DATAB(IA1,J7).EQ.11) GO TO 690	00011740
ISN 0346		J7=J7+1	00011750
ISN 0347		IF (J7.GT.IDB(2)) GO TO 760	00011760
ISN 0349		GO TO 520	00011770
ISN 0350	530	IF (MADIR.EQ.0) GO TO 550	00011780
ISN 0352	540	IF (DATAB(IA1,J7).EQ.41) GO TO 690	00011790
ISN 0354		J7=J7+1	00011800

ISN 0355		IF (J7.GT.IDB(2)) GO TO 760	00011810
ISN 0357		GO TO 540	00011820
ISN 0358	550	IF (GRP.EQ.0) GO TO 540	00011830
ISN 0360	560	IF (DATAB(IA1,J7).EQ.51) GO TO 690	00011840
ISN 0362		J7=J7+1	00011850
ISN 0363		IF (J7.GT.IDB(2)) GO TO 760	00011860
ISN 0365		GO TO 560	00011870
		C END RECEIVER ANTENNA SELECTION	00011880
		C RECEIVER SELECTION *****	00011890
ISN 0366	570	IC=7	00011900
ISN 0367		IERR=10	00011910
ISN 0368		IF (LS&LS.EQ.0) GO TO 770	00011920
ISN 0370		IERR=0	00011930
ISN 0371	580	IF (DATAB(IR1,J4).EQ.1) GO TO 590	00011940
ISN 0373		J4=J4+1	00011950
ISN 0374		IF (J4.GT.IDB(4)) GO TO 760	00011960
ISN 0376		GO TO 580	00011970
ISN 0377	590	IF (DATAB(IR2,J4).GE.COMRAT) GO TO 650	00011980
ISN 0379		J4=J4+1	00011990
ISN 0380		IF (J4.GT.IDB(4)) GO TO 760	00012000
ISN 0382		GO TO 580	00012010
ISN 0383	600	IC=8	00012020
		C COMMAND SIGNAL CONDITIONER *****	00012030
		C RECEIVER CONSTRAINT TESTED.	00012040
ISN 0384	610	IF (DATAB(IR3,J4).EQ.0) GO TO 630	00012050
ISN 0386	620	IF (DATAB(IR3,J4).EQ.DATAB(1,J5)) GO TO 640	00012060
ISN 0388		J5=J5+1	00012070
ISN 0389		IF (J5.GT.IDB(5)) GO TO 760	00012080
ISN 0391		GO TO 620	00012090
ISN 0392	630	IF (DATAB(IC1,J5).EQ.0) GO TO 640	00012100
ISN 0394		J5=J5+1	00012110
ISN 0395		IF (J5.GT.IDB(5)) GO TO 760	00012120
ISN 0397		GO TO 630	00012130
		C LINK SGLS OR USE	00012140
ISN 0398	640	IERR=10	00012150
ISN 0399		IF (LS&LS.EQ.0) GO TO 770	00012160
ISN 0401		IERR=0	00012170
ISN 0402		IF (DATAB(IC2,J5).EQ.1) GO TO 650	00012180
ISN 0404		J5=J5+1	00012190



ISN 0405	IF (J5.GT.IDB(5)) GO TO 760	00012200
ISN 0407	GO TO 610	00012210
	C COMMAND RATE	00012220
ISN 0408	650 IF (DATAB(IC3,J5).GE.DATAB(IR2,J4)) GO TO 690	00012230
ISN 0410	J5=J5+1	00012240
ISN 0411	IF (J5.GT.IDB(J5)) GO TO 760	00012250
ISN 0413	GO TO 610	00012260
	C	00012270
	C DIPLEXER SELECTION *****	00012280
ISN 0414	660 IC=9	00012290
ISN 0415	IF (F1.EQ.0.) GO TO 690	00012300
	C LINK SGLS OR USB	00012310
ISN 0417	IERR=10	00012320
ISN 0418	IF (LSGLS.EQ.0) GO TO 770	00012330
ISN 0420	IERR=0	00012340
ISN 0421	670 IF (DATAB(ID1,J6).EQ.1) GO TO 680	00012350
ISN 0423	J6=J6+1	00012360
ISN 0424	IF (J6.GT.IDB(6)) GO TO 760	00012370
ISN 0426	GO TO 670	00012380
	C DIPLEXER POWER	00012390
ISN 0427	680 JT=KPIC(4)	00012400
ISN 0428	IF (DATAB(ID2,J6).GE.DATAB(IT9,JT)) GO TO 690	00012410
ISN 0430	J6=J6+1	00012420
ISN 0431	IF (J6.GT.IDB(6)) GO TO 760	00012430
ISN 0433	GO TO 670	00012440
	C	00012450
	C PROGRAM CONTROL AND BOOK KEEPING *****	00012460
	C J1-BASEBAND ASSEMBLY UNIT	00012470
	C J2-TRANSMITTER ANTENNAS	00012480
	C J3-TRANSMITTER	00012490
	C J4-RECEIVER	00012500
	C J5-SIGNAL CONDITIONER	00012510
	C J6-DIPLEXER	00012520
	C J7-RECEIVER ANTENNA	00012530
ISN 0434	690 IF (IC.EQ.2.OR.IC.EQ.3) KPIC(IC)=J2	00012540
ISN 0436	IF (IC.EQ.4.OR.IC.EQ.5) KPIC(IC)=J3	00012550
ISN 0438	KONT=0	00012560
ISN 0439	IN=KPIC(IC)	00012570
ISN 0440	IF (IN.NE.0) KCHOSE(IC)=DATAB(1,IN)	00012580

ISN 0442	700	CONTINUE	00012590
ISN 0443		IF (IC.EQ.9.AND.ITER.NE.0) GO TO 740	00012600
ISN 0445		IF (IC.EQ.9.AND.IPIC(4).EQ.0) GO TO 740	00012610
ISN 0447		IF (IC.EQ.9) GO TO 710	00012620
ISN 0449		IF (INX.EQ.1.AND.(IC.EQ.2.OR.IC.EQ.4)) IC=IC+1	00012630
ISN 0451		ICX=IC+1	00012640
ISN 0452		GO TO (30,90,100,260,270,510,570,600,660), ICX	00012650
ISN 0453	710	ICK=10-IC	00012660
ISN 0454		DO 730 I=ICK,9	00012670
ISN 0455		II=10-1	00012680
ISN 0456		IC=II-1	00012690
ISN 0457		IF (KCHOSE(II).EQ.0) GO TO 720	00012700
ISN 0459		IF (KPIC(II)+1.GT.LIMPIC(II)) GO TO 720	00012710
ISN 0461		KPIC(II)=KPIC(II)+1	00012720
ISN 0462		GO TO 740	00012730
ISN 0463	720	IF (KPIC(II).EQ.0) GO TO 725	00012740
ISN 0465		KPIC(II)=RESET(II)	00012750
ISN 0466	725	IF (II.EQ.1) KCHOSE(1)=-1	00012760
ISN 0468	730	CONTINUE	00012770
ISN 0469	740	DO 750 I=1,9	00012780
ISN 0470	750	IPIC(I)=KPIC(I)	00012790
ISN 0471		IF (KONT.EQ.1.AND.KCHOSE(1).NE.-1.) GO TO 700	00012800
ISN 0473		IF (ITER.NE.0) GO TO 752	00012810
ISN 0475		DO 751 I=1,9	00012820
ISN 0476		IF (KCHOSE(I).EQ.0) GO TO 751	00012830
ISN 0478		KCHOSE(I) = 1	00012840
ISN 0479	751	CONTINUE	00012850
ISN 0480	752	CONTINUE	00012860
	C		00012870
	C		00012880
ISN 0481		J=0	00012890
ISN 0482		DO 753 I=1,9	00012900
ISN 0483		IF (KCHOSE(I).EQ.0) GO TO 753	00012910
ISN 0485		J=J+1	00012920
ISN 0486		ICHOSE(J)=KCHOSE(I)	00012930
ISN 0487	753	CONTINUE	00012940
ISN 0488		ICONV=J+1	00012945
ISN 0489	754	IF (J.EQ.9) GO TO 755	00012950
ISN 0491		J=J+1	00012960

ISN 0492		ICHOSE(J)=0	00012970
ISN 0493		GO TO 754	00012980
ISN 0494	755	CONTINUE	00012990
ISN 0495		ICHOSE(ICONV)=0	00012991
ISN 0496		ICHOSE(ICONV+1)=0	00012992
ISN 0497		IDB6=IDB(6)	00012993
ISN 0498		DO 780 I=1,9	00012994
ISN 0499		DO 780 J=1,IDB6	00012995
ISN 0500		IF (DATAB(1,J) .NE. ICHOSE(I)) GO TO 780	00012996
ISN 0502		IF (DATAB(22,J) .EQ. 0.) GO TO 780	00012997
ISN 0504		IF (ICHOSE(ICONV) .EQ. DATAB(22,J) .OR. ICHOSE(ICONV+1) .EQ. * DATAB(22,J)) GO TO 780	00012998
ISN 0506		IF (ICHOSE(ICONV) .NE. 0) GO TO 781	00012999
ISN 0508		ICHOSE(ICONV)=DATAB(22,J)	00013000
ISN 0509		GO TO 780	00013001
ISN 0510	781	ICHOSE(ICONV+1)=DATAB(22,J)	00013002
ISN 0511	780	CONTINUE	00013003
ISN 0512		IDB7=IDB(7)	00013004
ISN 0513		DO 757 I=1,11	00013010
ISN 0514		DO 756 J=1,IDB7	00013020
	C		00013030
ISN 0515		IF (DATAB(1,J).NE. ICHOSE(I)) GO TO 756	00013040
ISN 0517		IF (I .GE. ICONV) CONVWT=CONVWT+DATAB(23,J)*NCHOSE(I)	00013050
ISN 0519		WT = WT + DATAB(23,J)*NCHOSE(I)	00013055
ISN 0520		VOL = VOL + DATAB(24,J)*NCHOSE(I)	00013060
ISN 0521		PL = PL + DATAB(16,J)*NCHOSE(I)	00013070
ISN 0522		PLMIN = PLMIN + DATAB(18,J)*NCHOSE(I)	00013080
ISN 0523		GO TO 757	00013090
	C		00013100
ISN 0524	756	CONTINUE	00013110
	C		00013120
ISN 0525	757	CONTINUE	00013130
ISN 0526		RETURN	00013140
ISN 0527	760	CONTINUE	00013150
ISN 0528		IF (IC.EQ.2.OR.IC.EQ.3) KP1C(IC)=J2	00013160
ISN 0530		IF (IC.EQ.4.OR.IC.EQ.5) KP1C(IC)=J3	00013170
ISN 0532		KONT=1	00013180
ISN 0533		GO TO 710	00013190
ISN 0534	770	CONTINUE	00013200
			00013210

ISN 0535	ICHOSE(1)=-1	00013220
ISN 0536	RETURN	00013230
ISN 0537	END	00013240

\*OPTIONS IN EFFECT\*      NAME= MAIN,GPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF

\*STATISTICS\*      SOURCE STATEMENTS =      536 ,PROGRAM SIZE =      7994

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*      37K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

ISN 0002		SUBROUTINE BESS (X,BESJ,NMAX)	00013250
ISN 0003		DIMENSION BESJ(1), TJ(200)	00013260
ISN 0004		EULER=0.577215664901533	00013270
ISN 0005		PI=2.0/3.141592653589793	00013280
ISN 0006		NU22=20	00013290
ISN 0007		IF (10.-X) 10,10,20	00013300
ISN 0008	10	HATN=(1.05)*X+25.	00013310
ISN 0009		GO TO 30	00013320
ISN 0010	20	HATN=35./(3.5-ALOG(X))	00013330
ISN 0011	30	NU=HATN	00013340
ISN 0012		TJ(NU+2)=0.0	00013350
ISN 0013		TJ(NU+1)=0.000001	00013360
ISN 0014		DO 40 J=1,NU	00013370
ISN 0015		K=NU+1-J	00013380
ISN 0016		FK=K+K	00013390
ISN 0017	40	TJ(K)=FK*TJ(K+1)/X-TJ(K+2)	00013400
9-46 ISN 0018		SUM=0.0	00013410
ISN 0019		DO 50 J=3,NU,2	00013420
ISN 0020	50	SUM=SUM+TJ(J)	00013430
ISN 0021		SUM=SUM+SUM	00013440
ISN 0022		TK=1./(TJ(1)+SUM)	00013450
ISN 0023		N=1ABS(NMAX)+1	00013460
ISN 0024		DO 60 J=1,N	00013470
ISN 0025	60	BESJ(J)=TK*TJ(J)	00013480
ISN 0026		RETURN	00013490
ISN 0027		END	00013500

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 26 ,PROGRAM SIZE = 1604

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

121K BYTES OF CORE NOT USED

LEVEL 21.7 ( JAN 73 )

OS/360 FORTRAN H

```
COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF
ISN 0002      INTEGER FUNCTION RESET(K)                00013510
ISN 0003      COMMON /DBCOM/IDB(30),DATA(55,90)         00013520
ISN 0004      IF (K.EQ.1) RESET=1                      00013530
ISN 0006      IF (K.EQ.2.OR.K.EQ.3.OR.K.EQ.6) RESET=IDB(1)+1 00013540
ISN 0008      IF (K.EQ.4.OR.K.EQ.5) RESET=IDB(2)+1       00013550
ISN 0010      IF (K.EQ.7.OR.K.EQ.8.OR.K.EQ.9) RESET=IDB(K-4)+1 00013560
ISN 0012      RETURN                                    00013570
ISN 0013      END                                       00013580
```

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 12, PROGRAM SIZE = 378

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

125K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

SOURC ,EPDCD1C,NOLIST,NOCHECK,LOAD,NUMAP,NOEDIT,NOXREF

ISN 0002	SUBROUTINE SKID(N=QUIP,NCONF)	00013590
ISN 0003	COMMON /USER8/SKOME(7,5)	00013600
ISN 0004	COMMON /CHOS1/ICHUSE(60),NCHUSE(60),COST(5,60),REL(6,60),	00013610
	* THM(4,60),DPIA(11,60),DPSKED(7,60)	00013620
ISN 0005	COMMON /PRTCOM/ACCNCY,C1STAR,IP4L,MMDLLO,TRUNC,ITUNC,Dt,TL,	00013630
	* IODLR,QCR,SEJK,PMR,Pt,PU,TUOLU,QCP,SEIP,PMP,STAR,SATINV,MER,	00013631
	* MFINV,PAYR,PAYINV,PAYGUL,CSE,XLTOT,C1OT,FELR,F+FINV,DDTE,XVEST,	00013632
ISN 0006	* OPS,TSAVE(6),KOLP(60),ITTT,AN,IS,BS,AM,TF,BF,IC,IA,IB,TOTOPS	00013633
ISN 0007	DIMENSION CONF(22,5),TSUB(6),ICI(5),NEQUIP(5),NCONF(6)	00013640
ISN 0008	DATA ICI/0,5,8,10,15/	00013645
	DATA CONF/1.,1.5,1.,2.,1.5,3*1.,2.,12*1.,2.,	00013650
	* 6.,9.,6.,12.,9.,5.,6.,8.,4.,6*2.,6*4.,2.,	00013660
	* 22*7.,22*7.,-7,5*.0001,3*.0002,15*.00007,.0002/	00013670
ISN 0009	FK=4,5	00013680
	CONF ROWS ARE 1 TO 5 FOR S AND C	00013690
	6 TO 8 FOR AUXPRO	00013700
	9 TO 10 FOR DPI	00013710
	11 TO 15 FOR COMM	00013720
	16 TO 21 FOR EP	00013730
	22 FOR M F	00013740
ISN 0010	DO 1 J=1,6	00013750
ISN 0011	1 TSAVE(J)=0.	00013760
ISN 0012	DO 4 IS=1,5	00013770
ISN 0013	IF (IS .EQ. 1) ISTR1=1	00013780
ISN 0015	IF (IS .GT. 1) ISTR1=IEND+1	00013790
ISN 0017	IF (IS .EQ. 1) IEND=NEQUIP(1)	00013800
ISN 0019	IF (IS .GT. 1) IEND=IEND+NEQUIP(IS)	00013810
ISN 0021	TSUB(1)=0.	00013820
ISN 0022	TSUB(2)=0.	00013830
ISN 0023	C=0.	00013840
ISN 0024	NUM=0	00013850
ISN 0025	DO 2 J=ISTR1,IINT	00013860
ISN 0026	TCD=DPSKED(3,J)+DPSKED(4,J)	00013870
ISN 0027	IF (TCD .GT. TSUB(1)) TSUB(1)=TCD	00013880
ISN 0029	TCD=DPSKED(5,J)+DPSKED(6,J)	00013890
ISN 0030	IF (TCD .GT. TSUB(2)) TSUB(2)=TCD	00013900
ISN 0032	C=C+(1.335*DPSKED(1,J)+.41*DPSKED(2,J))*1000.	00013910

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ORIGINAL PAGE IS  
OF POOR QUALITY

ISN 0033	2	NUM=NUM+NCHDSE(J)	00013920
ISN 0034		XNUM=NUM	00013930
ISN 0035		REDUN=XNUM/NEQUIP(IS)	00013940
ISN 0036		IC=ICI(1S)+NCONF(1S)	00013950
ISN 0037		R=REDUN** .125	00013960
ISN 0038		TSUB(3)=CONF(IC,2)+CONF(IC,5)*R*CONF(IC,1)*C** .6667	00013970
ISN 0039		TSUB(4)=CONF(IC,3)+CONF(IC,4)*R*C	00013980
ISN 0040		TSDQ=TSUB(2)	00013990
ISN 0041		IF (TSUB(2) .LT. TSUB(3)+TSUB(4)) TSDQ=TSUB(3)+TSUB(4)	00014000
ISN 0043		TSUB(5)=CONF(IC,1)*PK*TSUB(3)	00014010
ISN 0044		TSUB(6)=TSUB(1)+TSDQ	00014015
ISN 0045		IF (TSUB(5) .LT. TSAVE(5)) TSAVE(5)=TSUB(5)	00014016
ISN 0047		IF (TSUB(5) .GE. TSAVE(5)) TSAVE(5)=TSUB(5)	00014017
ISN 0049		IF (TSUB(6) .LE. TSAVE(6)) GO TO 4	00014020
ISN 0051		DO 3 J=1,6	00014030
ISN 0052	3	TSAVE(J)=TSUB(J)	00014040
ISN 0053		ISSAVE=IS	00014050
ISN 0054	4	CONTINUE	00014060
	C	NOW DO MISSION EQUIP	00014070
ISN 0055		DO 5 J=1,3	00014080
ISN 0056		DO 5 I=1,7	00014090
ISN 0057		JJ=4-J	00014100
ISN 0058		IF (SKDME(I,JJ) .GT. 0.) GO TO 6	00014110
ISN 0060	5	CONTINUE	00014120
ISN 0061		JJ=0	00014130
ISN 0062	6	IF (JJ .EQ. 0) GO TO 20	00014140
ISN 0064		TSUB(1)=0.	00014150
ISN 0065		TSUB(2)=0.	00014160
ISN 0066		C=0.	00014170
ISN 0067		DO 8 J=1,JJ	00014180
ISN 0068		TCQ=SKDME(3,J)+SKDME(4,J)	00014190
ISN 0069		IF (TCQ .GT. TSUB(1)) TSUB(1)=TCQ	00014200
ISN 0071		TCQ=SKDME(5,J)+SKDME(6,J)	00014210
ISN 0072		IF (TCQ .GT. TSUB(2)) TSUB(2)=TCQ	00014220
ISN 0074	b	C=C+(1.335*SKDME(1,J)+1.41*SKDME(2,J))*1000.	00014230
ISN 0075		TSUB(3)=CONF(22,2)+CONF(22,5)*CONF(22,1)*C** .6667	00014240
ISN 0076		TSUB(4)=CONF(22,3)+CONF(22,4)*C	00014250
ISN 0077		TSDQ=TSUB(2)	00014260
ISN 0078		IF (TSUB(2) .LT. TSUB(3)+TSUB(4)) TSDQ=TSUB(3)+TSUB(4)	00014270



ISN 0080	TSUB(5)=CONF(22,1)*FK*TSUB(3)	00014280
ISN 0081	TSUB(6)=TSUB(1)+TSDQ	00014285
ISN 0082	IF (TSUB(5) .LT. TSAVE(5)) TSUB(5)=TSAVE(5)	00014286
ISN 0084	IF (TSUB(5) .GE. TSAVE(5)) TSAVE(5)=TSUB(5)	00014287
ISN 0086	IF (TSUB(6) .LT. TSAVE(6)) GO TO 20	00014290
ISN 0088	DO 9 J=1,6	00014300
ISN 0089	9 TSAVE(J)=TSUB(J)	00014310
ISN 0090	20 TSAVE(6)=TSAVE(6)+TSAVE(5)	00014320
ISN 0091	RETURN	00014330
ISN 0092	END	00014340

\*OPTIONS IN EFFECT\*      NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\*      SOURCE,FBCDIC,NOLIST,NOPECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\*      SOURCE STATEMENTS =      91 ,PROGRAM SIZE =      2202

\*STATISTICS\*      NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

101K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF			
ISN 0002		SUBROUTINE INITIL(NCONF,IEKR)	00000010
	C	THIS SUBROUTINE SETS APPROXIMATIONS FOR ALL VALUES IN ETWN	00000020
	C	WHICH ARE USED BEFORE THEY ARE CALCULATED	00000030
ISN 0003		DIMENSION NCONF(6)	00000040
ISN 0004		COMMON /USER1/DPHI,FE,YSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T,	00000050
		* PHIRX,PHIRY,PHIRZ,PDOTX,PDOTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY,	00000060
		* PDOTRZ,OMEGS,OMEGR,PJ,XNN,K,MANV,IPAYAW,EPI,AX,AY,AZ,	00000070
		* EA,FANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV,ISAT	00000080
ISN 0005		COMMON /USER1/ EQM1WT,EQM2WT,DIAMAX,ALT	00000090
ISN 0006		COMMON /PRTCOM/ACCRCY,C1STAR,IREL,MMDQLD,TRUNC,ITRUNC,DE,TE,	00000100
		* TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMP,SATR,SATINV,MER,	00000110
		* MEINV,PAYR,PAYINV,PAYQUL,GSE,XLTOT,CTOT,FEER,FEEINV,DDTE,XVEST,	00000120
		* OPS,SKTAU(6),TTL(60),TTT,AN,TS,BS,AM,TF,BF,TC,TA,TB,TOTOPS	00000130
ISN 0007		COMMON /BTWN/WT,VOL,DT,O,Dλ,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN,	00000140
		* LMBDU,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVWT,TKNWT,PASSTR,	00000150
		* SATWT,TPRIM,IBTLOC,RADA,RADAE,RAT,HTRPWR,HTRPRB,	00000160
		* HPT,HPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BIRAT(2),	00000170
		* EQBLG,SABLG,SATWT	00000180
ISN 0008		IERR=0	00000190
9-51 ISN 0009		ACCRCY=AMINI(PHIRX,PHIRY,PHIRZ)	00000200
ISN 0010		EQMWT=EQM1WT+EQM2WT	00000210
ISN 0011		SATWT=36.9*EQMWT** .672	00000220
ISN 0012		EQBVOL=.1*SATWT	00000230
ISN 0013		TPRIM=T	00000240
ISN 0014		N=NCONF(6)	00000250
ISN 0015		GO TO (20,10,30) ,N	00000260
	C	HERE IF A BOX	00000270
ISN 0016	10	EQBLG=(EQBVOL* 3456.)** .333	00000280
ISN 0017		EQBDIA=EQBLG	00000290
ISN 0018		EQBSID=.707*EQBDIA	00000300
ISN 0019		IF (EQBDIA .LE. DIAMAX) GO TO 11	00000310
ISN 0021		EQBDIA=DIAMAX	00000320
ISN 0022		EQBSID=.707*EQBDIA	00000330
ISN 0023		EQBLG=(EQBVOL*1728.)/(EQBSID*EQBSID)	00000340
ISN 0024	11	SATINX=(SATWT/6.)*EQBSID*EQBSID	00000350
ISN 0025		SATINY=(SATWT/12.)*(EQBSID*EQBSID+EQBLG*EQBLG)	00000360
ISN 0026		SATINZ=SATINY	00000370

ISN 0027		GO TO 100	00000380
	C	HERE IF A CYLINDER	00000390
ISN 0028	20	SATDAM=(EQBVOL*2201.)** .333	00000400
ISN 0029		EQBLG=SATDAM	00000410
ISN 0030		IF (SATDAM .LE. DIAMAX) GO TO 21	00000420
ISN 0032		SATDAM=DIAMAX	00000430
ISN 0033		EQBLG=EQBVOL*2201./(SATDAM*SATDAM)	00000440
ISN 0034	21	SATINX=(SATWT*SATDAM*SATDAM/8.)	00000450
ISN 0035		SATINY=(SATWT/12.)*( .75*SATDAM*SATDAM+EQBLG*EQBLG)	00000460
ISN 0036		SATINZ=SATINX	00000470
ISN 0037		GO TO 100	00000480
	C	HERE IF A SPHERE	00000490
ISN 0038	30	SATDAM=(EQBVOL*3300.9)** .333	00000500
ISN 0039		SATINX=.1*SATWT*SATDAM*SATDAM	00000510
ISN 0040		SATINY=SATINX	00000520
ISN 0041		SATINZ=SATINX	00000530
	C	IF SATDAM TOO BIG STOP PROGRAM	00000540
ISN 0042		IF (SATDAM .GT. DIAMAX) IERR=1	00000550
ISN 0044		IF (IERR .GT. 0) RETURN	00000560
ISN 0046		GO TO 100	00000570
	C	SETS VALUES NEEDED BY S AND C	00000580
ISN 0047	100	IF (NCONF(1) .NE. 1) GO TO 120	00000590
ISN 0049		RJ=SATINX	00000600
ISN 0050		DX=.5*SATDAM/12.	00000605
ISN 0051		GO TO 200	00000610
ISN 0052	120	IF (NCONF(1) .NE. 2) GO TO 130	00000620
ISN 0054		XJ=SATINX	00000630
ISN 0055		YJ=SATINY	00000640
ISN 0056		ZJ=SATINZ	00000650
ISN 0057		D=SATDAM	00000660
ISN 0058		DZ=.5*SATDAM	00000670
ISN 0059		IF (NCONF(6) .EQ. 2 ) GO TO 200	00000680
ISN 0061		IF (NCONF(6) .EQ. 1) DT=.5*EQBLG	00000690
ISN 0063		IF (NCONF(6) .EQ. 3) DT=.5*SATDAM	00000700
ISN 0065		DX=D1	00000710
ISN 0066		DY=DT	00000720
ISN 0067		GO TO 200	00000730
ISN 0068	130	IF (NCONF(1) .GT. 5) GO TO 200	00000740
ISN 0070		XJ=SATINX	00000750

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ISN 0071	YJ=SATINY	
ISN 0072	ZJ=SATINZ	00000760
ISN 0073	D=SATOAM	00000770
ISN 0074	IF (NCONF(6).EQ. 2) D=EQBDIA	00000780
ISN 0076	DT=.5*EQBLG	00000790
ISN 0077	IF (NCONF(6) .EQ. 3) DT=.5*SATOAM	00000800
ISN 0079	DX=.5*SATDAM	00000810
ISN 0080	IF (NCONF(6) .EQ. 2) DX=.5*EQBLG	00000820
ISN 0082	DY=DT	00000830
ISN 0083	DZ=DT	00000840
ISN 0084	200 CONTINUE	00000850
ISN 0085	300 COMRT=2000.	00000860
ISN 0086	RETURN	00000870
ISN 0087	END	00000880
		00000890

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NUMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 86 ,PROGRAM SIZE = 1280

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

109K BYTES OF CORE NOT USED

COMPILER OPTIONS -- NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
 SOURCE,EBCDIC,NOLIST,NOCHECK,LOAD,\*OMAP,\*NOEDIT,1D,NOXREF

ISN 0002	BLUCK DATA	00000900
	C SFTS ALL DFFAULT VALUES	00000910
ISN 0003	COMMON /USER1/DPHI,FL,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T, * PHIRX,PHIRY,PHIRZ,PDUTX,PDUTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY, * PDOTRZ,OMEGS,OMEGR,PJ,XNN,K,MANV,IPAYAW,EPI,AX,AY,AZ, * EA,FANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV,ISAT	00000920 00000930 00000940
ISN 0004	COMMON /USER2/TTHST,CLIFF	00000950
ISN 0005	COMMON /USER3/BTRMX,SCSFL,TPRFL,UPSMS,ARRAYN(11,3),NMSEQ	00000960
ISN 0006	COMMON /USER4/IOPTCM(3),IMSSEP,ISEQ,LSGLS,LUSB,FREQ(2),APOGEE,NET, * NADIR,FREQ,COMRAT,BWIDTH(2)	00000970 00000980
ISN 0007	COMMON /USER5/IVOLT,OPTEMP	00000990
ISN 0008	COMMON /USER6/EQPF,MB12ZH,EQMIXL,EQMIYL,EQMIZL,EQM2XL,EQM2YL, * EQM2ZL,ISBOFG,NUMEEQ,EEQWT(9),EEQVL(9),EM1YCG,EM1ZCG,EM2YCG, * EM2ZCG,CEEEX(9),EELOC(9),XCGSA1,XCGSA3	00001000 00001010 00001020
ISN 0009	COMMON /USER7/ISATUR,ORBINC	00001030
ISN 0010	COMMON /USER8/SKOME(7,3)	00001040
ISN 0011	COMMON /USER1/EQMIWT,EQM2WT,DIAMAX,ALT	00001050
ISN 0012	COMMON /USERR/KEOPT,SYSLB,KFIXED,SLBMX,ISPT,SPEC(6),SPEC1,ISUB	00001060
ISN 0013	COMMON /USERC/NEV,NGV,XMER,XMEU,FEPECT,IMETYP	00001070
ISN 0014	DATA DPHI,FF,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T/.25,4.1,100., * 3.,1.,3*62206000.,24./	00001080 00001090
ISN 0015	COMMON /USER9/CA,CE	00001100
ISN 0016	DATA PHIRX,PHIRY,PHIRZ,PDUTX,PDUTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY, * PDOTRZ/3*.75,6*1.,3*.012/	00001110 00001120
ISN 0017	DATA OMEGS,OMEGR,PJ,XNN,K,MANV,IPAYAW/1.5708,60.,75.,21.,1,1,0/	00001130
ISN 0018	DATA EPI,AX,AY,AZ/.0001,3*.05/	00001140
ISN 0019	DATA EA,EANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV * /.1.,1,12.,1.,20.,4.,100000.,.01.,.0667,40./	00001150 00001160 00001170
ISN 0020	DATA CLIFE/50000./	00001180
ISN 0021	DATA BTRMX,SCSFL,TPRFL,UPSMS,ARRAYN,NMSEQ/1024000.,36*0., * 0/	00001190 00001200
ISN 0022	DATA IVOLT,OPTEMP/70,15./	00001210
ISN 0023	DATA IOPTCM,IMSSEP,LSGLS,LUSB,FREQ,APOGEE,NET,NADIR,FREQ,COMRAT, * BWIDTH/0,0,0,0,1,0,2*2250.,500.,0,0,1800.,1000.,2*-1.E10/	00001220 00001230
ISN 0024	DATA EQPF,MB12ZH,EQMIXL,EQMIYL,EQMIZL,EQM2XL,EQM2YL/2.,1, * 5*40./	00001240
ISN 0025	DATA EQM2ZL,ISBOFG,NUMEEQ,EEQWT,EEQVL,EM1YCG,EM1ZCG,EM2YCG	00001250 00001260

	*/40.,2*0,21*0./	00001270
ISN 0026	DATA EM2ZCG,CGFEX,EELQC,XCGSA1,XCGSA3 /0.,9*2.,9*0.,2*1./	00001280
ISN 0027	DATA ISATOR,OKBINC/1,28.5/	00001290
ISN 0028	DATA SKPMF/21*0./	00001300
ISN 0029	DATA CA,CF/10.,5./	00001310
ISN 0030	DATA EQM1WT,EQM2WT,DIAMAX,ALT/2*45.,120.,500./	00001320
ISN 0031	DATA KEOPT,SYSLB,RFIXED,SLPMX,ISPT,SPEC,SPEC1,ISUB/1,0.,	00001330
	* 1.,50000.,0.,*9.,6,18.,0/	00001340
ISN 0032	DATA NFV,NQV,XMER,XMEU,FEEPCT,IMETYP/4,1,0.,0.,.07,2/	00001350
ISN 0033	END	00001360

\*OPTIONS IN EFFECT\*      NAME= MAIN,DPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\*      SOURCE,EBCDIC,NOLIST,NODECK,LOAD,WOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\*      SOURCE STATEMENTS =      32 ,PROGRAM SIZE =

\*STATISTICS\*      NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

117K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NODED11,ID,NUXRF

ISN	Code	Text	Address
ISN 0002	C	SUBROUTINE COSTS (NCONF,NEQUIP)	00001370
	C	*****	00001380
	C	** THIS SUBROUTINE COLLECTS COSTS FOR CATALOG ITEMS AND CALCULATES	**00001390
	C	** COSTS FOR CER ITEMS AND STORES THEM FOR OUTPUTTING	**00001400
	C	*****	00001410
ISN 0003	C	COMMON /ETWN/ WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TT,PL,PLMIN,	00001420
	1	LMBDD,ARIA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVWT,	00001430
	2	TNKWT,PASSTR,SATTWT,TPRIM,IBTLOC,KADA,RADAB,RAT,	00001440
	3	HTRPWR,HTRPRB,HPT,HTRPIPE,VCHP,HPT,FC,XNZERO,COMRT,	00001450
	4	ACSSN,BITRAT(2),EQBLG,SABDLG,SATWT	00001460
	C		00001470
ISN 0004	C	COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),PEL(6,60),THM(4,60)	00001480
	1	,DPIA(11,60)	00001490
ISN 0005	C	COMMON /PRTCUM/ACCRCY,CISTAR,IREL,MKDOLD,TRUNC,ITRUNC,DE,TE,TGCLR,	00001500
	1	QCR,SEIR,PMR,PE,PU,TOOLU,QCU,SEIP,PMP,SATR,SATINV,	00001510
	2	YMER,XMFINV,PAYR,PAYINV,PAYWUL,6SE,XLTOT,CTOT,FEER,	00001520
9-56	3	FEINV,DDIE,XVEST,UPS,SKTAV(6),RULD(60),T,AN,TS,BS,	00001530
	4	AM,TF,EF,TC,TA,TE,TUTOPS	00001540
ISN 0006	C	COMMON /USERC/NFV,NQV,XMER,XMEU,FEECT,IMETYP	00001550
ISN 0007	C	DIMENSION	00001560
	1	RL(6),RT(6),RP(6),BE(6),BT(6),BP(6),UPS(6),	00001570
	2	X(6),FR(6),FP(6),FT(6),FE(6),NCONF(6),NEQUIP(5),	00001580
	3	COMPR(60),COMP(60),SUBE(7),SUBT(7),SUBR(7),	00001590
	4	SUBU(7),SUBUP(7),SUBU(7),COMPSE(60),COMPSP(60),	00001600
	C	SUBSP(7),SUBSE(7)	00001610
ISN 0008	C	DATA	00001620
	1	FR /6*1./,	00001630
	2	FP /6*1./,	00001640
	3	FT /6*1./,	00001650
	4	FE /6*1./,	00001660
	5	RF /6000.,105603.,40500.,53700.,21638.,	00001670
	6	108000./,	00001680
	7	RT /1300.,98719.,25600.,43100.,11762.,40260./	00001690
	8	RP /2300.,5882.,3900.,23900.,67408.,32400./,	00001700
	9	BE /.4005.,.3334.,.4005.,.8156.,.585.,.4005/,	00001710
	A	BT /.4005.,.2869.,.4005.,.7137.,.678.,.4005/,	00001720
		BP /.3334.,.6960.,.3334.,.6781.,.5460.,.3334/,	00001730

	B	PY	/1./	SF	/1./	00001740
ISN 0009	SEIR = 0.					00001750
ISN 0010	QCR = 0.					00001760
ISN 0011	PMR = 0.					00001770
ISN 0012	SUMTD = 0.					00001780
ISN 0013	TQDLR = 0.					00001790
ISN 0014	SEIP = 0.					00001800
ISN 0015	QCU = 0.					00001810
ISN 0016	PMP = 0.					00001820
ISN 0017	SUMPT = 0.					00001830
ISN 0018	TOTSUM = 0.					00001840
ISN 0019	SATR = 0.					00001850
ISN 0020	SATINV = 0.					00001860
ISN 0021	MEINV = 0.					00001870
ISN 0022	PAYR = 0.					00001880
ISN 0023	PAYINV = 0.					00001890
ISN 0024	PAYQUL = 0.					00001900
ISN 0025	GSE = 0.					00001910
ISN 0026	XLTOT = 0.					00001920
ISN 0027	CTDT = 0.					00001930
ISN 0028	FEER = 0.					00001940
ISN 0029	FEEINV = 0.					00001950
ISN 0030	DDTF = 0.					00001960
ISN 0031	XVEST = 0.					00001970
ISN 0032	OPS = 0.					00001980
ISN 0033	DE = 0.					00001990
ISN 0034	TE = 0.					00002000
ISN 0035	PE = 0.					00002010
ISN 0036	PU = 0.					00002020
ISN 0037	SYSR = 0.					00002030
ISN 0038	SYSU = 0.					00002040
ISN 0039	Q5 = 0.					00002050
ISN 0040	P5P = 0.					00002060
ISN 0041	P5E = 0.					00002070
ISN 0042	DO 1 I=1,7					00002080
ISN 0043	SUB5P(I) = 0.					00002090
ISN 0044	SUB5E(1) = 0.					00002100
ISN 0045	SUBE(1) = 0.					00002110
ISN 0046	SUBT(1) = 0.					00002120



ISN 0047		SUBR(I)= 0.	
ISN 0048		SUBUE(I)=0.	00002130
ISN 0049		SUBUP(I)=0.	00002140
ISN 0050	1	SUBU(I) =0.	00002150
ISN 0051		DO I=1,60	00002160
ISN 0052		COMPU(I)=0.	00002170
ISN 0053	2	COMPR(I)=0.	00002180
ISN 0054		X(1) = WATE	00002190
ISN 0055		X(2) = HARNWT	00002200
ISN 0056		X(3) = THCMWT	00002210
ISN 0057		X(4) = CONVWT	00002220
ISN 0058		X(5) = TNKWT	00002230
ISN 0059		X(6) = PASSTK	00002240
	C		00002250
ISN 0060		I=1	00002260
	C		00002270
ISN 0061		100 IF (NCHOSE(I).EQ.0) GO TO 200	00002280
	C		00002290
	C	** COMPUTATIONS FOR CATALOG ITEMS	00002300
	C		00002310
	C		00002320
	C		00002330
ISN 0063		C1= COST(1,I)	00002340
ISN 0064		Q =NQV +NFV	00002350
ISN 0065		QP = Q * NCHOSE(I)	00002360
ISN 0066		Q5=5.*NCHOSE(I)	00002370
ISN 0067		P5 = COST (3,I)	00002380
ISN 0068		QREF = COST(4,I)	00002390
ISN 0069		FQ = NCHOSE(I)/QREF	00002400
ISN 0070		IF (FQ.LT.1.) FQ = 1.	00002410
ISN 0072		FRE = 0.8875 + 0.1125*FQ	00002420
ISN 0073		FRT = 0.3 + 0.7*FQ	00002430
	C	** COMPUTE DESIGN ENGINEERING COST, (DE OR COMPE)	00002440
ISN 0074		COST(1,I)=COST(1,I)*PI*FRE*1000.	00002450
	C	** COMPUTE TEST AND EVALUATION COST, (TE OR COMPT)	00002460
ISN 0075		COST(2,I)=COST(2,I)*PI*FRT*1000.	00002470
	C	** SUB-TOTAL ENGINEERING COSTS	00002480
ISN 0076		COMPR(I)= COST(1,I) + COST(2,I)	00002490
	C	** COMPUTE COMPONENT AVERAGE UNIT PRODUCTION COST,(PU OR COMPUP)	00002500
			00002510

ISN 0077		COST(3,I) = 1.277*P5*QP**0.848*PI*1000./Q	00002520
	C	** COMPUTE COMPONENT CUM AVG 5 UNIT PROD. COST	00002530
ISN 0078		COMP5P(I) = 200.* P5 * Q5**0.848 * PI * 1.277	00002540
	C	** COMPUTE COMPONENT AVERAGE PRODUCTION ENGINEERING (PE.OR COMPUE)	00002550
ISN 0079		COST(4,I) = 1.1*(QP**0.485-1.)*PI*FRE*1000./Q	00002560
	C	** COMPUTE COMPONENT CUM AVG 5 PROD. ENG. COST	00002570
ISN 0080		COMP5E(I) = 200. * C1 * (Q5**0.485 - 1.0) * FRE * PI	00002580
ISN 0081		COMPU(I) = COST(3,I) + COST(4,I)	00002590
ISN 0082		I = I + 1	00002600
ISN 0083		GO TO 100	00002610
	C		00002620
	C		00002630
	C		00002640
	C		00002650
	C	** COMPUTATIONS FOR SUBSYSTEM COSTS BASED ON COST ESTIMATING	00002660
	C	** RELATIONSHIPS (C.F.R.-S)	00002670
ISN 0084	200	M = 0	00002680
ISN 0085		J = I + 5	00002690
ISN 0086		ISAVE = I	00002700
ISN 0087		PRINT 9993	00002701
ISN 0088	9993	FORMAT(//)	00002702
	C		00002710
ISN 0089		DO 300 K = 1, J	00002720
ISN 0090		M = M + 1	00002730
ISN 0091		GO TO (210,260,220,260,240,250),M	00002740
	C	SET SOLAR ARRAY FACTORS (FOR ALL EXCEPT DUAL SPIN)	00002750
ISN 0092	210	ICONF = NCONF(1)	00002760
ISN 0093		GO TO (260,215,215,215,215),ICONF	00002770
	C		00002780
ISN 0094	215	FR(M) = 3.	00002790
ISN 0095		FT(M) = 3.	00002800
ISN 0096		FP(M) = 4.67	00002810
ISN 0097		FE(M) = 4.67	00002820
ISN 0098		GO TO 270	00002830
	C		00002840
	C		00002850
	C	SET THERMAL FACTORS (FOR ALL EXCEPT DUAL SPIN)	00002860
ISN 0099	220	ICONF = NCONF(1)	00002870
ISN 0100		GO TO (260,225,225,225,225),ICONF	00002880

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	C							00002890
ISN 0101		225	FR(M) = 3.					00002900
ISN 0102			FT(M) = 3.					00002910
ISN 0103			FP(M) = 4.67					00002920
ISN 0104			FE(M) = 4.67					00002930
ISN 0105			GO TO 270					00002940
	C							00002950
	C							00002960
	C							00002970
ISN 0106		240	ICONF = NCONF(2)					00002980
ISN 0107			GO TO (260,241,245),ICONF					00002990
	C							00003000
ISN 0108		241	FR(M) = 2.37					00003010
ISN 0109			FT(M) = 1.					00003020
ISN 0110			FP(M) = 1.					00003030
ISN 0111			FE(M) = 2.37					00003040
ISN 0112			GO TO 270					00003050
	C							00003060
09-6 ISN 0113		245	FR(M) = .9954					00003070
ISN 0114			FT(M) = 1.0					00003080
ISN 0115			FP(M) = 1.0					00003090
ISN 0116			FE(M) = .9954					00003100
ISN 0117			GO TO 270					00003110
	C							00003120
	C							00003130
	C							00003140
ISN 0118		250	ICONF = NCONF(1)					00003150
ISN 0119			GO TO (260,255,255,255,255),ICONF					00003160
ISN 0120		255	FR(M) = 3.					00003170
ISN 0121			FT(M) = 3.					00003180
ISN 0122			FP(M) = 4.67					00003190
ISN 0123			FE(M) = 4.67					00003200
ISN 0124			GO TO 270					00003210
	C							00003220
	C							00003230
ISN 0125		260	FR(M) = 1.					00003240
ISN 0126			FP(M) = 1.					00003250
ISN 0127			FT(M) = 1.					00003260
ISN 0128			FE(M) = 1.					00003270

ISN 0129	270	COMPER = RE(M)* X(M)**BE(M)	00003280
	C	DESIGN ENGINEERING COSTS (COMPE OR DE)	00003290
ISN 0130		COST(1,K) = COMPLR * SF * PI * FR(M)	00003300
	C	TEST + EVALUATION COSTS (CUMPT OR TE)	00003310
ISN 0131		COST(2,K) = RT(M)*X(M)**BT(M)*SF*PI*FT(M)	00003320
	C	SUBTOTAL	00003330
ISN 0132		COMPR(K) = CUST(1,K) + COST(2,K)	00003340
	C	UNIT PRODUCTION COST	00003350
ISN 0133		CUST(3,K) = RP(M)*X(M)**BP(M)*SF*PI*Q**(-.152)*FP(M)*1.277	00003360
	C	UNIT ENGINEERING COSTS	00003370
ISN 0134		COST(4,K) = COMPER*(1**0.485-1.0)*SF*PI*FE(M)/Q	00003380
	C	** COMPUTE COMPONENT CUM AVG 5 UNIT PROD. COST	00003390
ISN 0135		COMPSP(K) = 0.783 * COST(3,K) * Q**0.152	00003400
	C	** COMPUTE COMPONENT CUM AVG 5 PROD. ENG COST	00003410
ISN 0136		COMPSE(K) = 0.2365 * COST(4,K) * Q/(Q**0.485 - 1.0)	00003420
	C		00003430
	C	SUBTOTAL PRODUCTION	00003440
ISN 0137		COMPU(K) = COST(3,K) + COST(4,K)	00003450
	C		00003460
ISN 0138		GO TO (280,280,281,280,282,283),M	00003470
	C		00003480
		** EP CER SUB-TOTALING	00003490
19-6 ISN 0139	280	SUBE(5) = SUBE(5) + COST(1,K)	00003500
ISN 0140		SUBT(5) = SUBT(5) + COST(2,K)	00003510
ISN 0141		SUBR(5) = SUBR(5) + COMPR(K)	00003520
ISN 0142		SUBUE(5) = SUBUE(5) + COST(3,K)	00003530
ISN 0143		SUBUP(5) = SUBUP(5) + COST(4,K)	00003540
ISN 0144		SUBU(5) = SUBU(5) + COMPU(K)	00003550
ISN 0145		SUBSE(5) = SUBSE(5) + COMPSE(K)	00003560
ISN 0146		SUBSP(5) = SUBSP(5) + COMPSP(K)	00003570
ISN 0147		GO TO 300	00003580
	C		00003590
		** THERMAL CER SUB-TOTAL	00003600
ISN 0148	281	SUBE(7) = SUBE(7) + COST(1,K)	00003610
ISN 0149		SUBT(7) = SUBT(7) + COST(2,K)	00003620
ISN 0150		SUBR(7) = SUBR(7) + COMPR(K)	00003630
ISN 0151		SUBUE(7) = SUBUE(7) + COST(3,K)	00003640
ISN 0152		SUBUP(7) = SUBUP(7) + COST(4,K)	00003650
ISN 0153		SUBU(7) = SUBU(7) + COMPU(K)	00003660
ISN 0154		SUBSE(7) = SUBSE(7) + COMPSE(K)	00003670

ISN 0155		SUB5P(7) = SUB5P(7) + COMP5P(K)	00003670
ISN 0156		GO TO 300	00003680
	C		** AUX PROP CER SUB-TOTAL 00003690
ISN 0157	282	SUBE(2) = SUBE(2) + COST(1,K)	00003700
ISN 0158		SUBT(2) = SUBT(2) + COST(2,K)	00003710
ISN 0159		SUBR(2) = SUBR(2) + COMP(K)	00003720
ISN 0160		SUBUE(2) = SUBUE(2) + COST(3,K)	00003730
ISN 0161		SUBUP(2) = SUBUP(2) + COST(4,K)	00003740
ISN 0162		SUBU(2) = SUBU(2) + COMPU(K)	00003750
ISN 0163		SUB5E(2) = SUB5E(2) + COMP5E(K)	00003760
ISN 0164		SUB5P(2) = SUB5P(2) + COMP5P(K)	00003770
ISN 0165		GO TO 300	00003780
	C		** STRUCTURE CER SUB-TOTAL 00003790
ISN 0166	283	SUBE(6) = SUBE(6) + COST(1,K)	00003800
ISN 0167		SUBT(6) = SUBT(6) + COST(2,K)	00003810
ISN 0168		SUBR(6) = SUBR(6) + COMP(K)	00003820
ISN 0169		SUBUE(6) = SUBUE(6) + COST(3,K)	00003830
ISN 0170		SUBUP(6) = SUBUP(6) + COST(4,K)	00003840
ISN 0171		SUBU(6) = SUBU(6) + COMPU(K)	00003850
ISN 0172		SUB5E(6) = SUB5E(6) + COMP5E(K)	00003860
ISN 0173		SUB5P(6) = SUB5P(6) + COMP5P(K)	00003870
	C		00003880
	C		00003890
ISN 0174	300	CONTINUE	00003900
	C		00003910
	C	SUM SUB-TOTALS BY SUBSYSTEMS OF CATALOG ITEMS	00003920
	C		00003930
ISN 0175		IJ = 1	00003940
ISN 0176		IK = 0	00003950
ISN 0177		DO 320 J=1,5	00003960
ISN 0178		IF (J.NE.1) IJ = IK + 1	00003970
ISN 0180		IK = IK + NEQUIP(J)	00003980
	C		00003990
ISN 0181		DO 310 I=1J,IK	00004000
ISN 0182		SUBF(J) = SUBE(J) + COST(1,I)	00004010
ISN 0183		SUBT(J) = SUBT(J) + COST(2,I)	00004020
ISN 0184		SUBR(J) = SUBR(J) + COMP(I)	00004030
ISN 0185		SUBUE(J) = SUBUE(J) + COST(3,I)	00004040
ISN 0186		SUBUP(J) = SUBUP(J) + COST(4,I)	00004050

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ISN 0187		SUBU (J) = SUBU (J) + COMPU(I)	00004060
ISN 0188		SUBSE (J) = SUBSE (J) + COMPSE(I)	00004070
ISN 0189		SUBSP (J) = SUBSP (J) + COMPSP(I)	00004080
ISN 0190	310	CONTINUE	00004090
	C		00004100
ISN 0191	320	CONTINUE	00004110
	C		00004120
	C	** TOTAL COSTS FOR BASIC SPACECRAFT	00004130
	C		00004140
ISN 0192		DE 400 I = 1.7	00004150
ISN 0193		DE = DE + SUBE(I)	00004160
ISN 0194		TE = TE + SUBT(I)	00004170
ISN 0195		SYSR = SYSR + SUBR(I)	00004180
ISN 0196		PE = PE + SUBUE(I)	00004190
ISN 0197		PU = PU + SUBUP(I)	00004200
ISN 0198		SYSU = SYSU + SUBU(I)	00004210
ISN 0199		PSE = PSE + SUBSE(I)	00004220
ISN 0200		PSP = PSP + SUBSP(I)	00004230
ISN 0201	400	CONTINUE	00004240
	C		00004250
	C	COMPUTE TOOLING AND TEST EQUIPMENT	00004260
	C		00004270
ISN 0202		TOULP = 0.	00004280
ISN 0203		TOULU = 0.	00004290
ISN 0204		TOULS = 0.	00004300
	C		00004310
	C	COMPUTE QUALITY CONTROL	00004320
	C		00004330
ISN 0205		QCR = .015*DE + .14*TE	00004340
ISN 0206		QCU = .015*PE + .14*PU	00004350
ISN 0207		QCS = 0.015*PSE + 0.14*PSP	00004360
	C		00004370
	C	COMPUTE SYSTEMS ENGINEERING AND INTEGRATION	00004380
	C		00004390
ISN 0208		SEIR = .32*DE + .27*TE	00004400
ISN 0209		SEIP = .32*PE + .22*PU	00004410
ISN 0210		SEIS = 0.32*PSE + 0.22*PSP	00004420
	C		00004430
	C	COMPUTE PROGRAM MANAGEMENT	00004440

	C			00004450
ISN 0211		PMR = 0.19*DF + 0.02*TE		00004460
ISN 0212		PMP = 0.19*PL + 0.02*PL		00004470
ISN 0213		PM5 = 0.19*P5E + 0.02*P5P		00004480
	C			00004490
	C	*** TOTAL SPACE CRAFT COSTS		00004500
	C			00004510
ISN 0214		SATR = SYSR + TOULR + QCR + SEIR + PMR		00004520
ISN 0215		SATU = SYSU + TOULU + QCU + SFIP + PMP		00004530
	C			00004540
	C	*** TOTAL PAYLOAD COSTS		00004550
	C			00004560
ISN 0216		SATINV = NFV * SATU		00004570
ISN 0217		XMEINV = NFV * XMEU		00004580
ISN 0218		PAYR = SATR + XMER		00004590
ISN 0219		YMER = XMER		00004595
ISN 0220		PAYQUL = NQV * SATU		00004600
ISN 0221		PAYINV = SATINV + XMEINV		00004610
	C			00004620
	C	CUMULATIVE AVERAGE COST FOR FIVE(5) SPACECRAFT		00004630
	C			00004640
ISN 0222		SAT5 = P5E + P5P + TOUL5 + QCU + SEI5 + PM5		00004650
ISN 0223		SAT5 = 0.783*SATU*(4)**0.152		00004660
	C			00004670
	C	*** COMPUTE GROUND SUPPORT EQUIPMENT COST (DEVEL. AND PROD.)		00004680
	C			00004690
ISN 0224		IF (IMETYP.NE.1) GO TO 420	** SET FACTOR FOR COMSAT	00004700
	C			00004710
ISN 0226		+10 FGSE = 0.380		00004720
ISN 0227		GO TO 440		00004730
	C			00004740
ISN 0228		420 IF (NCONF(1).GE.2.AND.(NCONF(5).EQ.1.OR.NCONF(5).EQ.3.OK.NCONF(5).EQ.5)) GO TO 430		00004750
	C			00004760
	C		** SET FACTOR FOR GENERAL	00004770
ISN 0230		FGSE = 1.0		00004780
ISN 0231		GO TO 440		00004790
	C		** SET FACTOR FOR GENERAL PADDLE	00004800
ISN 0232		430 FGSE = 2.150		00004810
	C			00004820

ISN 0233	440 GSE = 25.13*SATR**0.738*FGSE	00004830
	C	00004840
	C *** COMPUTE LAUNCH COSTS	00004850
	C	00004860
ISN 0234	FL = 1.0	00004870
	C	00004880
ISN 0235	IF (NCONF(1).GE.2.AND.(NCONF(5).EQ.1.OR.NCONF(1).EQ.3 1 .OR.NCONF(5).EQ.5)) FL = 2.411	00004890
	C	00004900
	C COMPUTE UNIT LAUNCH COST	00004910
	C	00004920
ISN 0237	XLN = 1710.*SAT5**0.521 * FL	00004930
	C	00004940
	C *** COMPUTE TOTAL LAUNCH COSTS	00004950
	C	00004960
ISN 0238	XLTOT = NFV * XLN	00004970
	C	00004980
	C	00004990
	C	00050000
	C COMPUTE OPERATIONS COST	00050010
	C	00050020
9-65 ISN 0239	FFO = 1.	00050030
	C	00050040
ISN 0240	IF (NCONF(1).GE.2.AND.(NCONF(5).EQ.1.OR.NCONF(5).EQ.3 1 .OR.NCONF(5).EQ.5)) FFO = 4.6	00050050
	C	00050060
	C COMPUTE UNIT FLIGHT OPERATIONS COST	00050070
	C	00050080
ISN 0242	CFD = 0.5937* (SATR+SAT5)**0.716 * FFO	00050090
	C	00051000
	C COMPUTE TOTAL FLIGHT OPERATIONS COST	00051010
	C	00051020
ISN 0243	CTOT = NFV * CFD	00051030
	C	00051040
	C	00051050
	C	00051060
	C COMPUTE TOTALS	00051070
	C	00051080
	C	00051090
ISN 0244	FEER = FEERCT * (SATR + PAYQUL + GSE) **TOTAL DDT+E COST	00052000
	C	00052010



ISN 0245		DDTE = PAYR + PAYQUL + GSF + FEER		00005220
	C		**TOTAL INVESTMENT COST	00005230
ISN 0246		FEEINV = FEEPCT * SATINV		00005240
ISN 0247		XVEST = PAYINV + FEEINV		00005250
	C		**TOTAL OPERATIONS COST	00005260
ISN 0248		OPS = (XLTOT + CTOT) * (1.0 + FEEPCT)		00005270
	C			00005280
ISN 0249		RETURN		00005290
	C			00005300
ISN 0250		END		00005310

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,FBCPIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 249 ,PROGRAM SIZE = 7080 .

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

. 77K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,
SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF
ISN 0002 SUBROUTINE PRNT(IERR,NEQUIP,NACCEP,NCONF) 00005320
C 00005330
C ** THIS IS THE OUTPUT SUBROUTINE WHICH CONTROLS THE PRINTED **00005340
C ** OUTPUT OF ANY ACCEPTABLE DESIGN **00005350
C ** 00005360
ISN 0003 COMMON /BTWN/HT,VOL,DT,U,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN, 00005370
1 LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNHT,THCMWT,CONVHT,TNKWT,PASSTR,00005380
2 SATHT,TPKIM,IBLOC,RADA,KADAB,RAT,HTRPWR,HTRPRB,HPT,HTPIPE,VCHP,00005390
3 HPT,FC,XNZERO,CUMRT,ACSSN,BITRAT(2),EQBLG,SABOLG,SATWT 00005400
ISN 0004 COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MMDOLD,TRUNC,ITRUNC, DE,TE, 00005410
1 TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMP,SATR,SATINV,MER, 00005420
2 MEINV,PAYR,PAYINV,PAYQL,GSE,XLTOT,CTOT,FEER,FEEINV,DDTE,XVEST, 00005430
3 OPS, SKTAU(6),ROLD(60),T,AN,TS,BS,AM,TF,BF,TC,TA,TB,TOTOPS 00005440
ISN 0005 COMMON /CHDSE/ICHOSE(60),NCHUSE(60),CUST(5,60),REL(6,60), 00005450
1 THM(4,60),DPIA(11,60) 00005460
ISN 0006 COMMON /DBCUM/IDB(30),DATAB(55,90) 00005470
ISN 0007 DIMENSION IERR(7),NEQUIP(5),NCONF(6) 00005480
ISN 0008 REAL MMDOLD 00005490
ISN 0009 MMDOLD=MMDOLD/720. 00005493
ISN 0010 TRUNC=TRUNC/720. 00005494
ISN 0011 IF (NACCEP.GT.1) GO TO 100 00005500
ISN 0013 PRINT 9000 00005510
ISN 0014 9000 FORMAT(1H1) 00005520
ISN 0015 9001 FORMAT(/,1X) 00005530
ISN 0016 PRINT 9002 00005540
ISN 0017 9002 FORMAT(38X,41H** NASA SYSTEMS COST/PERFORMANCE STUDY **) 00005550
ISN 0018 PRINT 9001 00005560
ISN 0019 PRINT 9010 00005570
ISN 0020 9010 FORMAT (16H DEFINITIONS - ,/,25H CONFIGURATIONS (NCONF),/,5X, 00005580
136HSTABILIZATION AND CONTROL (NCONF(1)),15X,31HAUXILIARY PROPULSION00005590
2N (NCONF(2)),/,7X,23HNCONF(1)=1 IS DUAL SPIN,28X,22HNCONF(2)=1 IS 00005600
3COLD GAS,/,7X,22HNCONF(1)=2 IS YAW SPIN,29X,28HNCONF(2)=2 IS MONOP00005610
4ROPELLANT,/,7X,28HNCONF(1)=3 IS MASS EXPULSION,23X,26HNCONF(2)=3 100005620
5S BIPROPELLANT,/,7X,37HNCONF(1)=4 IS MASS EXPULSION W/ CMG-S,12X,200005630
65HCOMMUNICATIONS (NCONF(4)),/,7X,38HNCONF(1)=5 IS MASS EXPULSION W00005640
7/ M.W.-S,13X,42HNCONF(4)=1 IS SEPARATE UPLINK AND DOWNLINK,/,5X,4600005650
8HDATA PROCESSING AND INSTRUMENTATION (NCONF(3)),7X,41HNCONF(4)=2 100005660

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OF POOR QUALITY

9S UNIFIED LINK-COMMON ANTENNA, /, 7X, 39HNCONF(3)=1 IS GENERAL PURPOSE 00005670  
AE PROCESSOR, 1, X, 43HNCONF(4)=3 IS UNIFIED LINK-SEPARATE ANTENNA, /, 700005680  
BX, 39HNCONF(3)=2 IS SPECIAL PURPOSE PROCESSOR, 12X, 48HNCONF(4)=4 IS 00005690  
UNIFIED LINK-COMMON ANT + DOWNLINK, /, 5X, 27HELECTRICAL POWER (NCONF00005700  
D(5)), 26X, 50HNCONF(4)=5 IS UNIFIED LINK-SEPARATE ANT + DOWNLINK, /, 700005710  
EX, 44HNCONF(5)=1 IS SHUNT REGULATION - PADDLE MTD., 5X, 25HVEHICLE S100005720  
FZING (NCONF(6)), /, 7X, 42HNCONF(5)=2 IS SHUNT REGULATION - BODY MTD. 00005730  
G, 9X, 42HNCONF(6)=1 IS CYLINDER, /, 7X, 44HNCONF(5)=3 IS SHNT + DISCH. R00005740  
HEG - PADDLE MTD., 7X, 17HNCONF(6)=2 IS BOX, /, 7X, 42HNCONF(5)=4 IS SHN00005750  
IT + DISCH. REG - BODY MTD., 9X, 20HNCONF(6)=3 IS SPHERE) 00005760

ISN 0021  
ISN 0022

PRINT 9011

9011 FORMAT (7X, 44HNCONF(5)=5 IS SERIES LOAD REG. - PADDLE MTD., 5X, 11HRO0005780  
RELIABILITY, /, 7X, 42HNCONF(5)=6 IS SERIES LOAD REG. - BODY MTD., 9X, 400005790  
25HREDUNDANCY CONFIGURATION = 0 IS SINGLE STRING, /, 58X, 43HREDUNDANC00005800  
3Y CONFIGURATION = 1 IS DUAL STRING) 00005810

ISN 0023  
ISN 0024  
ISN 0025

PRINT 9001

PRINT 9012

9012 FORMAT (18H MESSAGES (IERR), /, 5X, 25HSTABILIZATION AND CONTROL, 2600005860  
1X, 20HAUXILIARY PROPULSION, /, 7X, 49HIERR = 0 MEANS NO MESSAGES, 2200005870  
2X, 27HIERR = 0 MEANS NO MESSAGES, /, 7X, 49HIERR = 1 MEANS MAX ALLO00005880  
3OWABLE SYS. ERROR UNSAT., 2X, 50HIERR = 1 MEANS CYCLE LIFE OF ATTIT00005890  
4UDE AND CONTROL, /, 7X, 42HIERR = 1X MEANS MAX RATE ERROR TOO SMALL00005900  
5, 25X, 42HTHRUSTERS IS TOO SHORT, /, 7X, 42HIERR = 1XX MEANS 3-AXIS WH00005910  
6EELS ACCEPTABLE, 9X, 52HIERR = 10 MEANS CYCLE LIFE OF TRANSLATIONAL 00005920  
7THRUSTER, /, 7X, 42HIERR = 1XXX MEANS DBL GIMB. CMGS ACCEPTABLE, 25X, 1200005930  
8HIS TOO SHORT, /, 5X, 35HDATA PROCESSING AND INSTRUMENTATION, 18X, 49HI00005940  
9ERR = 11 MEANS CYCLE LIVES OF BOTH THRUSTERS ARE, /, 7X, 30HIERR = 00005950  
A 0 MEANS NO MESSAGES, 37X, 9HTOO SHORT, /, 7X, 31HIERR = 1 MEANS M00005960  
BUX REQUIRED, 16X, 7HTHERMAL, /, 7X, 41HIERR = 10 WORD LENGTH GREATER00005970  
C THAN 256, 10X, 49HIERR = 1XXXXXXX MEANS BATT RAD AREA IS SUPPLIE00005980  
DD, /, 7X, 34HIERR = 100 BIT RATE IS TOO LARGE, 35X, 8HIN. RADAB, /, 7X, 300005990  
E6HIERR = 1000 SPEC. CMD. SYNC. FLG NE 0, 15X, 51HIERR = XIXXXXXXXX 00006000  
FMEANS OSK CONV. AND VARIABLE COND, /, 7X, 36HIERR = 10000 END OF DAT00006010  
GA BASE SENSED, 33X, 34HUCTANCE HEAT PIPE INFO IS REQUIRED, /, 5X, 14HVE00006020  
HHICLE SIZING, 39X, 45HIERR = XXIXXXXXXXX MEANS PHASE CONTROL MASS IS)00006030

ISN 0026

PRINT 9013

00006040  
00006050

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ISN 0027 9013 FORMAT (7X,26HIERR = 0 MEANS NO MESSAGES,43X,15HSUPPLIED IN PCM,/,00006060
17X,46HIERR = 1 MEANS BODY MOUNTED SOLAR ARRAY LENGTH,5X,50HIERR = 00006070
2XXX1XXXXXX MEANS ISOTHERMALIZER IS REQUIRED,/,16X,28HEXCEEDS EQUIP00006080
3MENT BAY LENGTH,14X,51HIERR = XXXX1XXXXX MEANS DIODE HEAT PIPE IS 00006090
4PEQUIRED,/,76X,12H(2 REQUIRED),/,58X,51HIERR = XXXX1XXXX MEANS 000006100
5NV. HEAT PIPE IS REQUIRED,/,58X,48HIERR = XXXXX1XXX MEANS OSR RADO0006110
6IATOR IS REQUIRED,/,58X,50HIERR = XXXXXXX1XX MEANS CONV. RADIATOR 00006120
7IS REQUIRED,/,58X,48HIERR = XXXXXXXXIX MEANS HEATER POWER IS SUPPL00006130
8IED,/,76X,9HIN HTRPWR,/,58X,49HIERR = XXXXXXXXXI MEANS RADIATOR ARO0006140
9EA IS SUPPLIED,/,16X,7HIN RADA) 00006150
C 00006160
C *****00006170
C 00006180
C BEGIN PRINTING OUTPUT STARTING WITH SANDC 00006190
C *****00006200
C 00006210
ISN 0028 100 PRINT 9000 00006220
ISN 0029 PRINT 8000,NACLEP 00006230
ISN 0030 8000 FORMAT (38H SYSTEM DESCRIPTION -- DESIGN NUMBER ,I3) 00006240
ISN 0031 PRINT 8005,NCONF(1) 00006250
ISN 0032 8005 FORMAT(28H STABILIZATION AND CONTROL,/,5X,24HCONFIGURATION IDENT00006260
IDENTIF, 6X,11) 00006270
ISN 0033 IK = NGEQUIP(1) 00006280
ISN 0034 PRINT 8010,(I,CHOSE(1),I=1,IK) 00006290
ISN 0035 8010 FORMAT (30H EQUIPMENT CODE IDENTIFIER,15(I,14)) 00006300
ISN 0036 PRINT 8015,(N,CHOSE(1),I=1,IK) 00006310
ISN 0037 8015 FORMAT(5X,20HEQUIPMENT QUANTITIES,5X,15(I,14)) 00006320
ISN 0038 PRINT 8020,ACCRCY 00006330
ISN 0039 8020 FORMAT(5X,15HCALCULATED ACCURACY,6X,t11.4,5H(DEG)) 00006340
ISN 0040 PRINT 8025,IFERR(1) 00006350
ISN 0041 8025 FORMAT(5X,4HIFERR,21X,110) 00006360
ISN 0042 PRINT 8030,NCONF(2) 00006370
ISN 0043 8030 FORMAT (5X,20HAUXILIARY PROPULSION,/,5X,24HCONFIGURATION IDENTIFIE00006380
IR, 6X,11) 00006390
ISN 0044 IJ = IK + 1 00006400
ISN 0045 IK = IK + NEQUIP(2) 00006410
ISN 0046 PRINT 8010,(I,CHOSE(I),I=IJ,IK) 00006420
ISN 0047 PRINT 8015,(N,CHOSE(1),I=IJ,IK) 00006430
ISN 0048 PRINT 8045,II 00006440

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ISN 0049	8045	FORMAT(5X,13HTOTAL IMPULSE,12X,E11.4,8H(LB-SEC))	00006450
ISN 0050		PRINT 8025,IERR(2)	00006460
ISN 0051		PRINT 8055,NCONF(3)	00006470
ISN 0052	8055	FORMAT(3X,35HDATA PROCESSING AND INSTRUMENTATION,/,5X,24HCONFIGURATION IDENTIFIER, 6X,I1)	00006480
ISN 0053		IJ = IK + 1	00006490
ISN 0054		IK = IK + NEQUIP(3)	00006500
ISN 0055		PRINT 8010,(IHOUSE(I),I=IJ,IK)	00006510
ISN 0056		PRINT 8015,(NHOUSE(I),I=IJ,IK)	00006520
ISN 0057		PRINT 8060,TLTOPS	00006530
ISN 0058	8060	FORMAT(5X,25HCOMPUTER OPERATIONS RATE ,E11.4,5H(IPS))	00006540
	C	PUT TOTAL STORAGE CAPACITY PRINT HERE LATER - - - - - * *	00006550
ISN 0059		PRINT 8025,IERR(3)	00006560
ISN 0060		PRINT 8070,NCONF(4)	00006570
ISN 0061	8070	FORMAT(3X,14HCOMMUNICATIONS,/,5X,24HCONFIGURATION IDENTIFIER, 6X,I00006590	00006580
		11)	00006590
ISN 0062		IJ = IK + 1	00006600
ISN 0063		IK = IK + NEQUIP(4)	00006610
ISN 0064		PRINT 8010,(YHOUSE(I),I=IJ,IK)	00006620
ISN 0065		PRINT 8015,(NHOUSE(I),I=IJ,IK)	00006630
ISN 0066		PRINT 8075,BITRAT(1)	00006640
ISN 0067	8075	FORMAT(5X,22HENGINEERING DATA RATE,6X,E11.4,6H(KBPS))	00006650
ISN 0068		PRINT 8080,BITRAT(2)	00006660
ISN 0069	8080	FORMAT(5X,28HMISSION EQUIPMENT DATA RATE ,E11.4,6H(KBPS))	00006670
	C		00006680
ISN 0070		PRINT 8090,NCONF(5)	00006690
ISN 0071	8090	FORMAT(3X,16HELECTRICAL POWER,/,5X,24HCONFIGURATION IDENTIFIER, 6X,I00006710	00006700
		1,II)	00006710
ISN 0072		IJ = IK + 1	00006720
ISN 0073		IK = IK + NEQUIP(5)	00006730
ISN 0074		PRINT 8010,(IHOUSE(I),I=IJ,IK)	00006740
ISN 0075		PRINT 8015,(NHOUSE(I),I=IJ,IK)	00006750
ISN 0076		PRINT 8100,PL	00006760
ISN 0077	8100	FORMAT(5X,32HTOTAL AVERAGE POWER REQUIREMENT ,E11.4,7H(WATTS))	00006770
ISN 0078		PRINT 8105,AREA	00006780
ISN 0079	8105	FORMAT(5X,16HSOLAR ARRAY AREA,16X,E11.4,7H(FT**2))	00006790
ISN 0080		PRINT 8110,CISTAR	00006800
ISN 0081	8110	FORMAT(5X,32HMINIMUM INSTALLED BATTERY CAP. ,E11.4,8H(AMP-HR))	00006810
	C		00006820
			00006830

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ISN 0082	PRINT 8120	00006840
ISN 0083	8120 FORMAT(3X,15HTHERMAL CONTROL)	00006850
ISN 0084	PRINT 8125,RADA,RADAB,RAT	00006860
ISN 0085	8125 FORMAT(5X,13HRADIATOR AREA,9X,E11.4,3X,31H(FT**2) , BATTERY RADIATOR AREA,8X,E11.4,3X,7H(FT**2),/,51X,19HTOTAL RADIATOR AREA,10X,2E11.4,2X,7H(FT**2))	00006870
ISN 0086	PRINT 8130,HTK PWR,HTRPRE,HPT	00006890
ISN 0087	8130 FORMAT(5X,12HEATER POWER,10X,E11.4,33H (BTU/HR) , BATTERY HEATER POWER,9X,E11.4,9H (BTU/HR),/,51X,18HTOTAL HEATER POWER,11X,E11.4,29H (BTU/HR))	00006910
ISN 0088	PRINT 8135,HTPIPL,VCHP,HTPT	00006920
ISN 0089	8135 FORMAT(5X,9HEAT PIPE,15X,E11.4,38H (BTU/HR) , VARIABLE CONDUCTANCE HEAT PIPE,14X,E11.4,9H (BTU/HR),/,51X,15HTOTAL HEAT PIPE,14X,E11.4,29H (BTU/HR))	00006930
ISN 0090	PRINT 8025,IERR(7)	00006940
ISN 0091	PRINT 9000	00006950
ISN 0092	PRINT 8140,T	00006990
ISN 0093	8140 FORMAT(3X,10HSTRUCTURES,/,5X,15H SKIN THICKNESS ,E11.4,4H(IN))	00007000
ISN 0094	PRINT 8145,AM,TS,BS	00007010
ISN 0095	8145 FORMAT(5X,25H STRINGER NO, THICKNESS, HT ,6X,F4.0,2H, ,E11.4,6H (IN),1,5X,E11.4,5H (IN))	00007020
ISN 0096	PRINT 8150,AM,IF,BF	00007030
ISN 0097	8150 FORMAT(5X,25H FRAME NO, THICKNESS, HT. ,6X,F4.0,2H, ,E11.4,6H (IN),1,5X,E11.4,5H (IN))	00007040
ISN 0098	PRINT 8155,TC,TB,TA	00007050
ISN 0099	8155 FORMAT(5X,30H END COVER THICKNESS - FORWARD ,E11.4,12H(IN),CENTER ,E11.4,9H(IN),AFT ,E11.4,4H(IN))	00007060
ISN 0100	PRINT 8160,NCONF(6),SATWT,SATLG,D,D	00007080
ISN 0101	8160 FORMAT(3X,14H VEHICLE SIZING,/,5X,24H CONFIGURATION IDENTIFIER, 6X,11,/,5X,14H LAUNCH WEIGHT,E11.4,6H(LBS),,14X,9H LENGTH ,E11.4,26H(IN) ,/,12X,7H WIDTH ,E11.4,35H(IN),,15X,9H HEIGHT ,E11.4,6H (IN),)	00007090
ISN 0102	PRINT 8165,XJ,YJ,ZJ	00007100
ISN 0103	8165 FORMAT(5X,6HI XX ,E11.4,12H (LB-IN**2),,6X,6HI YY ,E11.4,12H (LB-IN**2),,6X,6HI ZZ ,E11.4,12H (LB-IN**2))	00007110
ISN 0104	PRINT 8025,IERR(6)	00007120
ISN 0105	PRINT 8170,IRFL	00007130
ISN 0106	8170 FORMAT(3X,7H SAFETY,/,5X,25H REDUNDANCY CONFIGURATION ,I2)	00007140
		00007150
		00007160
		00007170
		00007180
		00007190
		00007200
		00007210
		00007220

ISN 0107	PRINT 8175,MMDOLD,ROLD(ITRUNC),TRUNC	00007230
ISN 0108	8175 FORMAT(5X,21HMEAN MISSION DURATION,E11.4,5H(MD),,11HRELIABILITY, E11.4,28H,RELIABILITY TRUNCATION TIME,E11.4,4H(MD))	00007240
ISN 0109	PRINT 8180	00007250
ISN 0110	8180 FORMAT(3X,33HCOST (ALL AMOUNTS ARE IN DOLLARS),/,5X,5HDDT+E,50X, 12HINVESTMENT(RECURRING))	00007260
ISN 0111	PRINT 8185,DI,PC	00007280
ISN 0111	8185 FORMAT(7X,18HDESIGN ENGINEERING,19X,F13.1,5X,16HUNIT ENGINEERING, 119X,F13.1)	00007290
ISN 0113	PRINT 8190,TE,PU	00007300
ISN 0114	8190 FORMAT(7X,19HTEST AND EVALUATION,18X,F13.1,5X,15HUNIT PRODUCTION, 120X,F13.1)	00007310
ISN 0115	PRINT 8195,TOOLR,TOOLU	00007320
ISN 0116	8195 FORMAT(7X,26HTOOLING AND TEST EQUIPMLNT,11X,F13.1,5X,26HTOOLING AN D TEST EQUIPMLNT,9X,F13.1)	00007330
ISN 0117	PRINT 8200,QCR,QCP	00007340
ISN 0118	8200 FORMAT(7X,15HQUALITY CONTROL,22X,F13.1,5X,15HQUALITY CONTROL,20X, 1F13.1)	00007350
ISN 0119	PRINT 8205,SEIR,SEIP	00007360
ISN 0120	8205 FORMAT(7X,35HSYSTEMS ENGINEERING AND INTEGRATION,2X,F13.1,5X, 135HSYSTEMS ENGINEERING AND INTEGRATION,F13.1)	00007370
ISN 0121	PRINT 8210,PMR,PMP	00007380
ISN 0122	8210 FORMAT(7X,18HPROGRAM MANAGEMENT,19X,F13.1,5X,18HPROGRAM MANAGEMENT 1,17X,F13.1)	00007390
ISN 0123	PRINT 8215	00007400
ISN 0124	8215 FORMAT(5X,15HCOST CATEGORY,12X,5HDDT+E,15X,10HINVESTMENT,10X, 110HOPERATIONS)	00007410
ISN 0125	PRINT 8220,SATR,SATINV	00007420
ISN 0126	8220 FORMAT(7X,10HSPACECRAFT,12X,F12.0,8X,F12.0)	00007430
ISN 0127	PRINT 8225,MER,MEINV	00007440
ISN 0128	8225 FORMAT(7X,17HMISSION EQUIPMENT,5X,F12.0,8X,F12.0)	00007450
ISN 0129	PRINT 8230,PAYR,PAYINV	00007460
ISN 0130	8230 FORMAT(7X,13HTOTAL PAYLOAD,9X,F12.0,8X,F12.0)	00007470
ISN 0131	PRINT 8235,PAYQUL	00007480
ISN 0132	8235 FORMAT(7X,19HQUALIFICATION UNITS,3X,F12.0)	00007490
ISN 0133	PRINT 8240,USE	00007500
ISN 0134	8240 FORMAT(7X,6H S.E.,16X,F12.0)	00007510
ISN 0135	PRINT 8245,XLTOT	00007520
ISN 0136	8245 FORMAT(7X,14HLAUNCH SUPPORT,48X,F12.0)	00007530
		00007540
		00007550
		00007560
		00007570
		00007580
		00007590
		00007600
		00007610

ISN 0137		PRINT 8250,CTOT	00007620
ISN 0138	8250	FORMAT(7X,17HFLIGHT OPERATIONS,45X,F12.0)	00007630
ISN 0139		PRINT 8255,FEER,FEEINV	00007640
ISN 0140	8255	FORMAT(7X,14HCONTRACTOR FEE,8X,F12.0,8X,F12.0)	00007650
ISN 0141		PRINT 8260,DDTE,XVEST,OPS	00007660
ISN 0142	8260	FORMAT(7X,13HPROGRAM TOTAL,4X,F12.0,8X,F12.0,8X,F12.0)	00007670
ISN 0143		PRINT 8270	00007680
ISN 0144	8270	FORMAT(3X,9HSCHEDULE)	00007690
ISN 0145		PRINT 8280,SKTAU(1)	00007700
ISN 0146	8280	FORMAT(5X,57HDESIGN AND COMPONENT DEVELOPMENT TIME,8X,F5.1,8H(MONTHS))	00007710
ISN 0147		PRINT 8290,SKTAU(3)	00007720
ISN 0148	8290	FORMAT(5X,26HSUBSYSTEM DEVELOPMENT TIME,19X,F5.1,8H(MONTHS))	00007730
ISN 0149		PRINT 8300,SKTAU(2)	00007740
ISN 0150	8300	FORMAT(5X,28HCOMPONENT QUALIFICATION TIME,17X,F5.1,8H(MONTHS))	00007760
ISN 0151		PRINT 8310,SKTAU(4)	00007770
ISN 0152	8310	FORMAT(5X,28HSUBSYSTEM QUALIFICATION TIME,17X,F5.1,8H(MONTHS))	00007780
ISN 0153		PRINT 8320,SKTAU(5)	00007790
ISN 0154	8320	FORMAT(5X,45HSYSTEM DEVELOPMENT AND FLIGHT READINESS TIME ,F5.1,18H(MONTHS))	00007800
ISN 0155		PRINT 8330,SKTAU(6)	00007810
ISN 0156	8330	FORMAT(5X,29HSCHEDULE DURATION (TO LAUNCH),16X,F5.1,8H(MONTHS))	00007820
	C		00007830
	C		00007840
	C		00007850
ISN 0157		RETURN	00007860
	C		00007870
ISN 0158		END	00007880
			00007890

\*OPTIONS IN EFFECT\* NAME= MAIN,DPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 157 ,PROGRAM SIZE = 8978

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

89K BYTES OF CORE NOT USED



ISN	Code	Text	Address
		COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,FBCPIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,NOXREF	
ISN 0002		SUBROUTINE SANDC(IPIC,IERR,ITER,NCONF,ICHOSE,NCHOSE)	
	C	ICHOSE(10) IS SELECTED EQUIP AS FOUR DIGIT EQUIP = --- MANF =	0000001C
	C	NCONF IS CONFIGURATION NUMBER,ITER IS NUMBER OF THIS ITERATION	00000020
	C	IERR IS A MULTIPLE MESSAGE ERROR FLAG,IPIC IS THE LAST	00000030
	C	SET OF SUBSCRIPTS CHOSEN	00000040
	C	COMMON USER LISTS USER INPUT PARAMETERS	00000050
	C	COMMON BTWN LISTS NECESSARY COMMUNICATION BETWEEN SUBROUTINES	00000060
	C	COMMON CDATA HAS LAST SUBSCRIPT FOR EACH PIECE OF EQUIP,AND	00000070
	C	THE NECESSARY PIECE OF THE DATA BASE	00000080
ISN 0003		DIMENSION ICHOSE(9),IPIC(3),ES(6),C(5),DMA(2),S(3),F(9),NCHOSE(9)	00000090
ISN 0004		DIMENSION NCONF(6)	00000100
ISN 0005		COMMON /USER1/DPHI,FE,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T, *PHIRX,PHIRY,PHIRZ,PDOTX,PDOTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY, *PDOTRZ,OMEGS,OMEGR,PJ,XNN,K,MANV,IPAYAM,EP1,AX,AY,AZ, * EA,EANT,ALPHA,TL,TACCEL,XMNN,THOLD,PDOTAV,PDOTST,PHIFOV,ISAT	00000110 00000120 00000130 00000140
ISN 0006		COMMON /BTWN/ WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN, * LMBOD,ARFA,SATLG,WATE,MC,ACSWP,HARNWT,THCMWT,CONVWT,TKNWT,PASSTR, * SATIWT,I PRIM,IBTLOC,RADA,RADAB,RAT,HTKPWR,PTRPRB, * HPT,HTH1PE,VCHP,HTPT,FC,XVZEF0,COMPT,ACSSN,BIRAT(2), * FQBLG,SABOLG,SATWT	00000150 00000160 00000170 00000180 00000190
	9-74		
ISN 0007		COMMON /DBCOM/IDB(30),DATAB(55,90)	00000200
ISN 0008		COMMON /USER1/EQM1WT,EQM2WT,DIAMAX,ALT	00000210
ISN 0009		DATA XMD,YMD,ZMD,DI,XMD2,YMD2,ZMD2/3*.0003,.03,3*.04/	00000220
ISN 0010		ACSSN=2.	00000230
ISN 0011		IF (NCONF(1) .EQ. 1) GO TO 10	00000240
ISN 0013		DT=D1/12.	00000250
ISN 0014		D=D/12.	00000260
ISN 0015		DX=DX/12.	00000270
ISN 0016		DY=DY/12.	00000280
ISN 0017		DZ=DZ/12.	00000290
ISN 0018		XJ=XJ/4636.8	00000300
ISN 0019		YJ=YJ/4636.8	00000310
ISN 0020		ZJ=ZJ/4636.8	00000320
ISN 0021		RJ=1.	00000330
ISN 0022		CONVWT=0.	00000340
ISN 0023	10	RJ=RJ/4636.8	00000350
ISN 0024		WT=0.	00000360 00000370

ISN 0025		VOL=0.	00000380
ISN 0026		PL=0.	00000390
ISN 0027		PLMIN=0.	00000400
ISN 0028		IF (NCONF(1) .EQ. 2) GO TO 200	00000410
ISN 0030		IF (NCONF(1) .EQ. 3) GO TO 300	00000420
ISN 0032		IF (NCONF(1) .EQ. 4) GO TO 400	00000430
ISN 0034		IF (NCONF(1) .EQ. 5) GO TO 500	00000440
	C	INITIALIZE FOR DUAL SPIN	00000450
ISN 0036		IERR=0	00000460
ISN 0037		DO 100 I=1,7	00000470
ISN 0038		II=IDB(I)	00000480
ISN 0039		IF (ITER .EQ. 0) NCHOSE(1)=1	00000490
ISN 0041		WT=WT+DATAB(23,II)*NCHOSE(I)	00000500
ISN 0042		VOL=VOL+DATAB(24,II)*NCHOSE(I)	00000510
ISN 0043		PL=PL+DATAB(16,II)*NCHOSE(I)	00000520
ISN 0044		PLMIN=PLMIN+DATAB(18,II)*NCHOSE(I)	00000530
ISN 0045	100	ICHOSE(1)=DATAB(1,II)	00000540
ISN 0046		IF (ITER .EQ. 0) NCHOSE(8) =1	00000550
ISN 0048		IF (ITER .EQ. 0) NCHOSE(9)=1	00000552
ISN 0050		IF (ITER .EQ. 0) NCHOSE(7)=2	00000555
ISN 0052		I14=IDB(13)+1	00000560
ISN 0053		ICHOSE(9)=DATAB(1,I14)	00000570
ISN 0054		II=IDB(6)	00000580
ISN 0055		CONV+T=DATAB(23,I14)*NCHOSE(9)	00000590
ISN 0056		WT=WT+DATAB(23,II4)*NCHOSE(9)	00000600
ISN 0057		VOL=VOL+DATAB(24,I14)*NCHOSE(9)	00000610
ISN 0058		PL=PL+DATAB(16,I14)*NCHOSE(9)	00000620
ISN 0059		PLMIN=PLMIN+DATAB(18,I14)*NCHOSE(9)	00000630
ISN 0060		IF (IPIC(1) .NE. 0) J1=IPIC(1)+1	00000650
ISN 0062		IF (ITER .GT. 0) J1=IPIC(1)	00000660
ISN 0064		IF (IPIC(1) .EQ. 0) J1=IDB(7) +1	00000670
ISN 0066		IF (J1 .GT. IDB(8) ) GO TO 118	00000680
ISN 0068		J1E=IDB(8)	00000690
	C	ES(6) CORRES EARTH SENSORS,G(5) CURRES CONTROL TIMING	00000700
	C	DMA(2) CORRES DESPIN MECH ASMB,G(3) CURRES GIMBAL,	00000710
	C	GH CORRES GIMBAL ANGLE	00000720
ISN 0069		IF (ITER .GT. 0) GO TO 112	00000730
ISN 0071	103	DO 104 I=1,6	00000740
ISN 0072	104	ES(I)=DATAB(I+5,J1)	00000750

ISN 0073	II=IDB(1)	00000760
ISN 0074	DO 106 I=1,2	00000770
ISN 0075	106 DMA(I)=DATAB(I+6,II)	00000780
ISN 0076	II=IDB(6)	00000790
ISN 0077	DO 108 I=1,5	00000800
ISN 0078	108 C(I)=DATAB(I+5,II)	00000810
ISN 0079	II=IDB(7)	00000820
ISN 0080	DO 110 I=1,3	00000830
ISN 0081	110 G(I)=DATAB(I+5,II)	00000840
ISN 0082	II=IDB(5)	00000850
ISN 0083	GH=DATAB(6,II)	00000860
ISN 0084	112 XM1=.116*(320.*60.*XNN)/(21.*RJ*OMEGR)	00000870
ISN 0085	XM2=.03*(360.*60.*XNN)/(21.*RJ*OMEGR)	00000880
ISN 0086	XK2=SQRT((XNN*ES(2)/21.)**2+(XNN*ES(6)/21.)**2+(XNN*DMA(2)/21.)**2+20000890	00000900
ISN 0087	XK1=SQRT((ES(1)/2.94)**2+(ES(3)/2.94)**2+C(4)**2+C(5)**2+ *(75.*DMA(1)/PJ)**2+(.75/PJ)**2)	00000910
ISN 0088	EZ=XM1+XK2	00000920
ISN 0089	IF (K.EQ.1) GO TO 114	00000930
ISN 0091	EY=SQRT(ES(4)**2+ES(5)**2)+XK1	00000940
ISN 0092	EX=EZ	00000950
ISN 0093	GO TO 116	00000960
ISN 0094	114 GT=G(1)*G(1)+G(2)*G(2)+G(3)*G(3)	00000970
ISN 0095	EY=SQRT(ES(4)**2+ES(5)**2)+SQRT(XK1**2+GT+C(1)**2+GH*GH)	00000980
ISN 0096	FX=SQRT(XM1**2+C(4)**2)+SQRT(XK2**2+C(1)**2+C(2)**2+C(3)**2 *+GH*GH+GT)	00000990
ISN 0097	116 IF (EX .LE. PHIRX .AND. EY .LE. PHIRY .AND. EZ .LE. PHIRZ) * GO TO 120	00001000
ISN 0099	J1=J1+1	00001010
ISN 0100	IF (J1 .LE. J1E) GO TO 103	00001020
	C LAST ONE CHECK'D AND NONE FOUND	00001030
ISN 0102	119 ICHOSE(8)=-1	00001040
ISN 0103	RETURN	00001050
	C ACCEPTABLE DEVICE SELECTED	00001060
ISN 0104	120 IPIC(1)=J1	00001070
ISN 0105	IPIC(2)=0	00001080
ISN 0106	ICHOSE(8)=DATAB(1,J1)	00001090
ISN 0107	WT=WT+DATAB(23,J1)*NCHOSE(8)	00001100
ISN 0108	VOL=VOL+DATAB(24,J1)*NCHOSE(8)	00001110
		00001120
		00001130
		00001140

ISN 0109		PL=PL+DATAB(16,J1)*NCHOSE(8)	00001150
ISN 0110		PLMIN=PLMIN+DATAB(18,J1)*NCHOSE(8)	00001160
ISN 0111		TI=267.*TPRIM	00001170
ISN 0112		FF=2.5	00001180
ISN 0113		+C=14.1E-9*FF*DX*DI/(RJ*.4*PHIRX)	00001190
ISN 0114		RETURN	00001200
	C	YAW SPIN CONFIG	00001210
	C	INITIALIZE SKIPPING SOME IF ITERATING	00001220
ISN 0115	200	IERR=0	00001230
ISN 0116		TEMPIN=SATINX	00001240
ISN 0117		SATINX=SATINZ	00001250
ISN 0118		SATINZ=TEMPIN	00001260
ISN 0119		I1=IDB(8)+1	00001270
ISN 0120		ICHOSE(1)=DATAB(1,I1)	00001280
ISN 0121		I2=IDB(9)+1	00001290
ISN 0122		I3=IDB(10)+1	00001300
ISN 0123		ICHOSE(2)=DATAB(1,I2)	00001310
ISN 0124		ICHOSE(3)=DATAB(1,I3)	00001320
ISN 0125		I14=IDB(13)+1	00001330
ISN 0126		ICHOSE(6)=DATAB(1,I14)	00001340
ISN 0127		I7=IDB(2)	00001350
ISN 0128		ICHOSE(7)=DATAB(1,I7)	00001360
ISN 0129		IF (ITER .GT. 0) GO TO 203	00001370
ISN 0131		DO 202 I=1,9	00001380
ISN 0132	202	NCHOSE(I)=1	00001390
ISN 0133	203	WT=WT+NCHOSE(1)*DATAB(23,I1)+NCHOSE(2)*DATAB(23,I2)+NCHOSE(3)* * DATAB(23,I3)+NCHOSE(6)*DATAB(23,I14)+NCHOSE(7)*DATAB(23,I7)	00001400 00001410
ISN 0134		CONVWT=DATAB(23,I14)*NCHOSE(6)	00001420
ISN 0135		VOL=VOL+NCHOSE(1)*DATAB(24,I1)+NCHOSE(2)*DATAB(24,I2)+NCHOSE(3)* * DATAB(24,I3)+NCHOSE(6)*DATAB(24,I14)+NCHOSE(7)*DATAB(24,I7)	00001430 00001440
ISN 0136		PL=PL+NCHOSE(1)*DATAB(16,I1)+NCHOSE(2)*DATAB(16,I2)+NCHOSE(3)* * DATAB(16,I3)+NCHOSE(6)*DATAB(16,I14)+NCHOSE(7)*DATAB(16,I7)	00001450 00001460
ISN 0137		PLMIN=PLMIN+NCHOSE(1)*DATAB(18,I1)+NCHOSE(2)*DATAB(18,I2)+ * NCHOSE(3)*DATAB(18,I3)+NCHOSE(6)*DATAB(18,I14)+NCHOSE(7)* * DATAB(18,I7)	00001470 00001480
ISN 0138		ICHOSE(8)=0	00001490
ISN 0139		ICHOSE(9)=0	00001500
	C	IERR=1 MAX ALLOWABLE SYSTEM ERROR UNACCEPTABLE	00001510
ISN 0140		IF (PHIRX .LT. .125) IERR=1	00001530

ISN 0142		DB=PHIRX*.4	00001540
ISN 0143		IF (DB .LT. .05) DB=.05	00001550
	C	CALCULATE F VALUES	00001560
ISN 0145		F(1)=(DPHI*DT/57.3+.04*D)*FE/DY	00001570
ISN 0146		F(2)=(DPHI*DT/57.3+.04*D)*FE/DZ	00001580
ISN 0147		F(3)=2.*.04*D*DPHI/57.3*FE/DX	00001590
ISN 0148		F(4)=XMD/DX	00001600
ISN 0149		F(5)=YMD/DY	00001610
ISN 0150		FMIN=AMAX1(F(1),F(2),F(3),F(4),F(5))	00001620
ISN 0151		FMAX=(PDOTRX*XJ)/(2.*DI*DX)	00001630
	C	IERR 1X MAX RATE ERROR TOO SMALL	00001640
ISN 0152		IF (FMAX .LT. 2.*FMIN) IERR=IERR+10	00001650
ISN 0154		FF=2.*FMIN	00001660
ISN 0155		IF (FMAX .LT. FF) FF=FMIN	00001670
ISN 0157		TDM=AMAX1(XMD,YMD)	00001680
ISN 0158		E=540.*TDM/(DX*FF)+.12-DB	00001690
ISN 0159		IF ( E .LT. 0.) E=0.	00001700
	C	SELECT EARTH SENSOR WITH PHIX)=PHIRX	00001710
ISN 0161		IF (IPIC(1) .GT. 0) GO TO 204	00001720
ISN 0163		J1=IDB(11)+1	00001730
ISN 0164		GO TO 206	00001740
ISN 0165	204	J1=IPIC(1)	00001750
ISN 0166	206	J1E=IDB(12)	00001760
ISN 0167		E1=DATAB(6,J1)	00001770
ISN 0168		II=IDB(10)	00001780
ISN 0169		PHIX=SQRT(DATAB(7,J1)**2+DATAB(8,J1)**2)+DB+DATAB(11,II)+E	00001790
ISN 0170		IF (DATAB(6,J1) .GT. DB) GO TO 211	00001800
ISN 0172		IF (PHIX .GT. PHIRX) GO TO 211	00001810
ISN 0174		ICHOSE(4)=DATAB(1,J1)	00001820
ISN 0175		IPIC(1)=J1	00001830
	C	EARTH SENSOR SET	00001840
ISN 0176		GO TO 212	00001850
ISN 0177	211	J1=J1+1	00001860
ISN 0178		IPIC(2)=0	00001870
ISN 0179		IF (J1 .LE. J1E) GO TO 206	00001880
	C	MINUS ONE FLAG FOR NOT FOUND	00001890
ISN 0181		ICHOSE(4)=-1	00001900
ISN 0182		ICHOSE(5)=0	00001910
ISN 0183		RETURN	00001920

ISN 0184	C	HERE WHEN ACCEPTABLE EARTH SENSOR FOUND	00001930
		212 H=ZJ * OMEGS	00001940
	C	SELECT REACTION WHEEL WITH MOMENTUM GRTR THAN H	00001950
ISN 0185		J2=IPIC(2)	00001960
ISN 0186		IF (J2 .GE. IDB(13) .AND. ITER .EQ. 0) IPIC(2)=0	00001970
ISN 0188		IF (IPIC(2) .EQ. 0) J2=IDB(12)+1	00001980
ISN 0190		IF (ITER .EQ. 0 .AND. IPIC(2) .NE. 0) J2=J2+1	00001990
ISN 0192		J2E=IDB(13)	00002000
ISN 0193	214	H1=DATAB(6,J2)	00002010
ISN 0194		IF ( H1 .GT. H) GO TO 218	00002020
ISN 0196		J2=J2+1	00002030
ISN 0197		IF ( J2 .LE. J2E) GO TO 214	00002040
ISN 0199		IPIC(2)=0	00002050
ISN 0200		GO TO 211	00002060
	C	ACCEPTABLE COMBINATION FOUND	00002070
ISN 0201	218	ICHOSE(5)=DATAB(1,J2)	00002080
ISN 0202		IPIC(2)=J2	00002090
ISN 0203		WT=WT+DATAB(23,J2)*NCHOSE(5)+DATAB(23,J1)*NCHOSE(4)	00002100
ISN 0204		VOL=VOL+DATAB(24,J2)*NCHOSE(5)+DATAB(24,J1)*NCHOSE(4)	00002110
ISN 0205		PL=PL+DATAB(16,J2)*NCHOSE(5)+DATAB(16,J1)*NCHOSE(4)	00002120
ISN 0206		PLMIN=PLMIN+DATAB(18,J2)*NCHOSE(5)+DATAB(18,J1)*NCHOSE(4)	00002130
ISN 0207		XI=37000000.*TPRIM*DX*(FF*D1)**2/(XJ*.4*PHIRX)	00002140
		**2./57.3*.04*D*DPHI*FE*TSMALL/DX	00002150
		**XNU*XJ*PDOTO/(57.3*DX)	00002160
		**2.*XJ*PDOTX*XN/(57.3*DX)	00002170
		**XMD*TAUX/DX	00002180
ISN 0208		YI=37000000.*TPRIM*DY*(FF*D1)**2/(YJ*.4*PHIRY)	00002190
		**+(DPHI/57.3*D1+.04*D)*FE*TSMALL/DY	00002200
		**XNU*YJ*PDOTO/(57.3*DY)	00002210
		**2.*YJ*PDOTY*YN/(57.3*DY)	00002220
		**YMD*TAUY/DY	00002230
ISN 0209		ZI=(DPHI/57.3*DT+.04*D)*FE*TSMALL/DZ	00002240
		**XNU*ZJ*PDOTO/(57.3*DZ)	00002250
		**2.*ZJ*PDOTZ*ZN/(57.3*DZ)	00002260
ISN 0210		I=XI+YI+ZI	00002270
ISN 0211		FC=14.1E-9*FF*DX*D1/(XJ*.4*PHIRX)	00002280
ISN 0212		RETURN	00002290
	C	3-AXIS M CONFIG	00002300
	C	CHOSEN AS	00002310

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	C	ATTITUDE REF	00002320
	C	VALVE	00002330
	C	ASC	00002340
	C	GYROS	00002350
	C	EARTH SENSOR	00002360
	C	INITIALIZE	00002370
ISN 0213	300	IERR=0	00002380
ISN 0214		I1=IDB(14)+1	00002390
ISN 0215		I2=IDB(15)+1	00002400
ISN 0216		ICHOSE(1)=DATAB(1,I1)	00002410
ISN 0217		ICHOSE(2)=DATAB(1,I2)	00002420
ISN 0218		I14=IDB(13)+1	00002430
ISN 0219		ICHOSE(3)=DATAB(1,I14)	00002440
ISN 0220		IF (ITER .GT. 0) GO TO 303	00002450
ISN 0222		DO 302 I=1,9	00002460
ISN 0223	302	NCHOSE(1)=1	00002470
ISN 0224	303	WT=WT+NCHOSE(1)*DATAB(23,I1)+NCHOSE(2)*DATAB(23,I2)+DATAB(24,I14)*NCHOSE(3)	00002480
ISN 0225		CONVWT=DATAB(23,I1)*NCHOSE(1)	00002490
ISN 0226		VOL=VOL+NCHOSE(1)*DATAB(24,I1)+NCHOSE(2)*DATAB(24,I2)+NCHOSE(3)*DATAB(24,I14)	00002500
ISN 0227		PL=PL+NCHOSE(1)*DATAB(16,I1)+NCHOSE(2)*DATAB(16,I2)+NCHOSE(3)*DATAB(16,I14)	00002510
ISN 0228		PLMIN=PLMIN+NCHOSE(1)*DATAB(18,I1)+NCHOSE(2)*DATAB(18,I2)+NCHOSE(3)*DATAB(18,I14)	00002520
ISN 0229		DO 301 I=6,9	00002530
ISN 0230	301	ICHOSE(1)=0	00002540
ISN 0231		OMF60=1.1864*10.**8/(24.053*1000.*1000.+6076.*ALT)**1.5	00002550
	C	CALCULATE F VALUES	00002560
ISN 0232		F(1)=(DPHI*DT/57.3+.04*D)*FE/DY	00002570
ISN 0233		F(2)=(DPHI*DT/57.3+.04*D)*FE/DZ	00002580
ISN 0234		F(3)=2.*.04*D*DPHI/57.3*F1/DX	00002590
ISN 0235		F(4)=XMD/DX	00002600
ISN 0236		F(5)=YMD/DY	00002610
ISN 0237		F(6)=ZMD/DZ	00002620
ISN 0238		FMIN=AMAX1(F(1),F(2),F(3),F(4),F(5),F(6))	00002630
ISN 0239		F(7)=POUTRX*YJ/(D1*DX)	00002640
ISN 0240		F(8)=POUTRY*YJ/(D1*DY)	00002650
ISN 0241		F(9)=POUTRZ*ZJ/(D1*DZ)	00002660

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ISN 0242		FMAX=AMAX1(F(7),F(8),F(9))	00002710
ISN 0243		IERR=0	00002720
	C	IERR 1X MAX RATE ERROR TOO SMALL	00002730
ISN 0244		IF (FMAX .LT. 2.*FMIN) IERR=IERR+10	00002740
ISN 0245		FF=2.*FMIN	00002750
ISN 0247		IF (FMAX .LT. FF) FF=FMIN	00002760
ISN 0249		DBX=.4*PHIRX	00002770
ISN 0250		DBY=.4*PHIRY	00002780
ISN 0251		DBZ=.4*PHIRZ	00002790
ISN 0252		IF (DBX .LT. .05) DBX=.05	00002800
ISN 0254		IF (DBY .LT. .05) DBY=.05	00002810
ISN 0256		IF (DBZ .LT. .05) DBZ=.05	00002820
ISN 0258		DDBX=.1*DBX	00002830
ISN 0259		DDBY=.1*DBY	00002840
ISN 0260		DDBZ=.1*DBZ	00002850
ISN 0261		R1=.2*PDOTRX	00002860
ISN 0262		R2=.2*PDOTRY	00002870
ISN 0263		R3=.2*PDOTRZ	00002880
ISN 0264		R=AMAX1(R1,R2,R3)	00002890
	C	SELECT 3 GYROS	00002900
ISN 0265		IF (IPIC(1) .GT. 0) GO TO 304	00002910
ISN 0267		J1=IDB(16)+1	00002920
ISN 0268		GO TO 306	00002930
ISN 0269	304	J1=IPIC(1)	00002940
ISN 0270	306	J1E=IDB(17)	00002950
ISN 0271		GTEST=DATAB(6,J1)	00002960
ISN 0272		IF (GTEST .GT. R) GO TO 308	00002970
ISN 0274		ICHOSE(4)=DATAB(1,J1)	00002980
ISN 0275		IPIC(1)=J1	00002990
	C	GYRO SET	00003000
ISN 0276		I1=IDB(14)+1	00003010
ISN 0277		G1=DATAB(8,I1)/(DATAB(11,I1)+OMEGO)	00003020
ISN 0278		G2=(DATAB(8,I1)*DATAB(10,I1)-DATAB(7,I1)*(DATAB(11,I1)+OMEGO))	00003030
		* 7/(OMEGO*(DATAB(11,I1)+OMEGO))	00003040
ISN 0279		G3=DATAB(10,I1)/(OMEGO*(DATAB(11,I1)+OMEGO))	00003050
ISN 0280		GO TO 310	00003060
ISN 0281	308	J1=J1+1	00003070
ISN 0282		IPIC(2)=0	00003080
ISN 0283		IF (J1 .LE. J1E) GO TO 306	00003090



	C	MINUS ONE FLAG FOR NOT FOUND	
ISN 0285		ICHOSE(4)=-1	00003100
ISN 0286		ICHOSE(5)=0	00003110
ISN 0287		RETURN	00003120
	C	SELECT EARTH SENSOR	00003130
ISN 0288	310	J2=IPIC(2)	00003140
ISN 0289		IF(J2.GE.IDB(18).AND.ITER.EQ.0) IPIC(2)=0	00003150
ISN 0291		IF(IPIC(2).EQ.0) J2>IDB(17)+1	00003160
ISN 0293		IF(ITER.EQ.0.AND.IPIC(2).NE.0) J2=J2+1	00003170
ISN 0295		J2E>IDB(18)	00003180
ISN 0296	314	PPHIN=DATAB(6,J2)*DATAB(6,J2)*DATAB(6,I1)/DATAB(13,J2)* * ATAN(DATAB(13,J2)/DATAB(9,I1))	00003190
ISN 0297		POMEN=DATAB(6,J2)*DATAB(6,J2)/DATAB(13,J2)*.026	00003200
ISN 0298		E=SQRT(DATAB(7,J2)**2+DATAB(11,J2)**2)+SQRT(DATAB(9,J2)**2 * +DATAB(10,J2)**2)	00003210
ISN 0299		EY=DBY+SQRT(PPHIN+(DATAB(12,J2)*DATAB(6,I1)/DATAB(9,I1))**2 *+(E*DATAB(6,I1)/DATAB(9,I1))**2+AY*AY+(EPI/DATAB(9,I1))**2 *+DDBY*DDBY)	00003220
ISN 0300		EX=DBX+SQRT(POMEN+(DATAB(12,J2)*G1)**2+E*E*G1*G1+AX*AX+DDBX*DDBX)	00003230
ISN 0301		EZ=DBZ+SQRT((DATAB(7,J1)*OMEGA*G3)**2+(DATAB(6,J1)*G3)**2 * +DATAB(7,J1)**2+(DATAB(6,J1)/OMEGA)**2+AZ*AZ+(DATAB(12,J2) * *G2)**2+DDEZ*DDEZ)	00003240
ISN 0302		IF(EX.LT.PHIRX.AND.EY.LT.PHIRY.AND.EZ.LT.PHIRZ) * GO TO 318	00003250
ISN 0304		J2=J2+1	00003260
ISN 0305		IF(J2.LE.J2E) GO TO 314	00003270
ISN 0307		IPIC(2)=0	00003280
ISN 0308		GO TO 308	00003290
	C	ACCEPTABLE COMBINATION FOUND	00003300
ISN 0309	318	ICHOSE(5)=DATAB(1,J2)	00003310
ISN 0310		IPIC(2)=J2	00003320
ISN 0311		WT=WT+DATAB(23,J2)*NCHOSE(5)+DATAB(23,J1)*NCHOSE(4)	00003330
ISN 0312		VOL=VOL+DATAB(24,J2)*NCHOSE(5)+DATAB(24,J1)*NCHOSE(4)	00003340
ISN 0313		PL=PL+DATAB(16,J2)*NCHOSE(5)+DATAB(16,J1)*NCHOSE(4)	00003350
ISN 0314		PLMIN=PLMIN+DATAB(18,J2)*NCHOSE(5)+DATAB(18,J1)*NCHOSE(4)	00003360
ISN 0315		XI=37000000.*TPRIM*DX*(FF*D1)**2/(XJ*DBX) *+2./57.3*.04*D*DPhi*FL*TSMALL/DX *+XNU*XJ*PDOTO/(57.3*DX) *+2.*XJ*PDOTX*XN/(57.3*DX)	00003370
			00003380
			00003390
			00003400
			00003410
			00003420
			00003430
			00003440
			00003450
			00003460
			00003470
			00003480

ISN 0316		**XMD*TAUX/DX	00003490
		YI=37000000.*TPRIM*DY*(FF*DI)**2/(YJ*DBY)	00003500
		**+(DPHI/57.3*DT+.04*D)*FE*TSMALL/DY	00003510
		**XNU*YJ*PDOTG/(57.3*DY)	00003520
		**2.*YJ*PDOTY*YN/(57.3*DY)	00003530
ISN 0317		**YMD*TAUY/DY	00003540
		ZI=37000000.*TPRIM*DZ*(FF*DI)**2/(ZJ*DBZ)	00003550
		**+(DPHI/57.3*DT+.04*D)*FE*TSMALL/DZ	00003560
		**XNU*ZJ*PDOTG/(57.3*DZ)	00003570
		**2.*ZJ*PDOTZ*ZN/(57.3*DZ)	00003580
		* +ZMD*TAUZ/DZ	00003590
ISN 0316		TI=XI+YI+ZI	00003600
ISN 0319		FC=14.1E-9*FF*DX*DI/(XJ*.4*PHIRX)	00003610
ISN 0320		RETURN	00003620
	C	CONFIGURATION 4	00003630
ISN 0321	400	IERR=0	00003640
ISN 0322		QJ1=XJ*PDOTX/57.3	00003650
ISN 0323		QJ2=YJ*PDOTY/57.3	00003660
ISN 0324		QJ3=ZJ*PDOTZ/57.3	00003670
ISN 0325		HMAN=AMAXI(QJ1,QJ2,QJ3)	00003680
ISN 0326		TMD=AMAXI(XMD2,YMD2,ZMD2)	00003690
ISN 0327		HREQ=HMAN+8000.*TL*TMD	00003700
ISN 0328		TREQ=HMAN/TACCLL+TMD	00003710
	C	TEST IF ONLY 3-AXIS WHEELS OKAY	00003720
ISN 0329		PDDTM=AMAXI(PDOTX,PDOTY,PDOTZ)	00003730
ISN 0330		PDOTRM=AMINI(PDOTRX,PDOTRY,PDOTRZ)	00003740
ISN 0331		IF (TREQ/HREQ .GE. .02 .AND. .0000853*PDDTM .LT. PDOTRM) GO TO 403	00003750
ISN 0333		DL 402 I=1,9	00003760
ISN 0334	402	ICHOSE(I)=-1	00003770
	C	TEST IF 3-AXIS ACCEPTABLE	00003780
	C	IERR IXX MEANS 3-AXIS WHEELS ACCEPTABLE	00003790
ISN 0335	403	IF (TREQ/HREQ .LT. .1) IERR=100	00003800
	C	IERR IXXX MEANS DOUBLE GIMBAL CMG'S ACCEPTABLE	00003810
ISN 0337		IF (TACCLL .LT. 20.) IERR=IERR+1000	00003820
ISN 0339		HL=HMAN+TMD*TL	00003830
ISN 0340		HS=AMINI(QJ1,QJ2,QJ3)	00003840
ISN 0341		HS=HS+TMD*TL	00003850
	C	SET FIXED EQUIPMENT ELECTRONICS PROCESSOR, VALVE DRIVER,	00003860
	C	SENSOR(SUN OR HDR120N)	00003870

ISN 0342		I1=IDB(18)+1	
ISN 0343		I2=IDB(15)+1	00003880
ISN 0344		IF (ISAT .EQ. 1) I3=IDB(17)+1	00003890
ISN 0346		IF (ISAT .GT. 1) I3=IDB(8)+1	00003900
ISN 0348		ICHOSE(1)=DATAB(1,I1)	00003910
ISN 0349		ICHOSE(2)=DATAB(1,I2)	00003920
ISN 0350		ICHOSE(3)=DATAB(1,I3)	00003930
ISN 0351		ICHOSE(7)=0	00003940
ISN 0352		ICHOSE(6)=0	00003950
ISN 0353		ICHOSE(9)=0	00003960
ISN 0354		IF (ITER .GT. 0) GO TO 407	00003970
ISN 0356		DO 405 I=1,9	00003980
ISN 0357		405 NCHOSE(I)=1	00003990
ISN 0358		407 WT=WT+NCHOSE(1)*DATAB(23,I1)+NCHOSE(2)*DATAB(23,I2)+DATAB(23,I3)	00004000
		**NCHOSE(3)	00004010
ISN 0359		VOL=VOL+NCHOSE(1)*DATAB(24,I1)+NCHOSE(2)*DATAB(24,I2)+DATAB(24,I3)	00004020
		**NCHOSE(3)	00004030
ISN 0360		PL=PL+NCHOSE(1)*DATAB(16,I1)+NCHOSE(2)*DATAB(16,I2)+DATAB(16,I3)	00004040
		**NCHOSE(3)	00004050
ISN 0361		PLMIN=PLMIN+NCHOSE(1)*DATAB(18,I1)+NCHOSE(2)*DATAB(18,I2)+	00004060
		* DATAB(18,I3)*NCHOSE(3)	00004070
	C	SELECT CMG	00004080
ISN 0362		GAMMA=ATAN(HS*(XNNN-2.)/(HL*XNNN))	00004090
ISN 0363		H=HS/(XNNN*SIN(GAMMA))	00004100
ISN 0364		IF (IPIC(1) .GT. 0) J1=IPIC(1)	00004110
ISN 0366		IF (IPIC(1) .EQ. 0) J1=IDB(19)+1	00004120
	C	RETURNS HERE TO TEST NEW CMG	00004130
ISN 0368		410 IF (DATAB(6,J1) .LT. H) GO TO 414	00004140
ISN 0370		SDOTM=2.*H/(TACCEL*DATAB(6,J1))	00004150
ISN 0371		TMAX=DATAB(6,J1)*PDDTM/57.3	00004160
ISN 0372		IF (SDOTM .LL. DATAB(7,J1) .AND. TMAX .LE. DATAB(8,J1))GO TO 417	00004170
ISN 0374		41+ J1=J1+1	00004180
ISN 0375		IF (J1 .LT. IDB(20)) GO TO 410	00004190
ISN 0377		ICHOSE(4)=-1	00004200
ISN 0378		ICHOSE(5)=0	00004210
ISN 0379		ICHOSE(6)=0	00004220
ISN 0380		RETURN	00004230
	C	CMG SELECTED	00004240
ISN 0381		417 ICHOSE(4)=DATAB(1,J1)	00004250
			00004260

ISN 0382		NCHOSE(4)=XNNN	00004270
ISN 0383		XKK=DATAB(7,J1)*PDOTM/57.3	00004280
ISN 0384		W=-32.+(.068+.29*XKK)*(DATAB(6,J1)+960.)	00004290
ISN 0385		P=(.0103+.0235*XKK)*(DATAB(6,J1)+1430.)	00004300
ISN 0386		V=7.45+(.00255-.0062*XKK)*(DATAB(6,J1)-1720.)	00004310
ISN 0387		DATAB(23,J1)=W	00004320
ISN 0388		DATAB(24,J1)=V	00004330
ISN 0389		DATAB(18,J1)=P	00004340
	C	GYRO NEXT	00004350
ISN 0390		IF (IPIC(1) .GT. 0) J2=IPIC(2)	00004360
ISN 0392		IF (IPIC(2) .EQ. 0) J2=IDB(10)+1	00004370
ISN 0394	420	ICHOSE(5)=DATAB(1,J2)	00004380
	C	SELECT STAR SENSOR	00004390
ISN 0395		PHIR=AMINI(PHIRX,PHIRY,PHIRZ)	00004400
ISN 0396		TSMAX=.3*PHIR	00004410
ISN 0397		J3=IPIC(3)	00004420
ISN 0398		IF (J3 .GE. IDB(21) .AND. ITER .EQ. 0) IPIC(3)=0	00004430
ISN 0400		IF (IPIC(3) .EQ. 0) J3=IDB(20)+1	00004440
ISN 0402		IF (ITER .EQ. 0 .AND. IPIC(3) .NE. 0) J3=J3+1	00004450
ISN 0404	422	IF (DATAB(6,J3) .GT. 1. .AND. PDOTST .GT. 2.) GO TO 440	00004460
ISN 0406		IF (DATAB(6,J3) .EQ. 2. .AND. PHIFOV .GT. 30.) GO TO 440	00004470
ISN 0408		IF (DATAB(6,J3) .EQ. 1. .AND. PDOTAV .LE. .016) GO TO 440	00004480
ISN 0410		IF (DATAB(6,J3) .EQ. 1. .AND. THOLD .GT. TSMAX) GO TO 440	00004490
ISN 0412		IF (DATAB(6,J3) .GT. 1.) GO TO 424	00004500
ISN 0414		IF (DATAB(9,J3)*.451 .LT. 4.) GO TO 440	00004510
ISN 0416		XNM=ALOG10(-4.+.451*DATAB(9,J3))	00004520
ISN 0417		TSC=57.3/(XNM*DATAB(8,J3)*PDOTM)	00004530
ISN 0418		DPHIAV=PDOTM*TSC	00004540
ISN 0419		PHIEB=DATAB(6,J2)*TSC	00004550
ISN 0420		PHIESF=DATAB(7,J2)*DPHIAV	00004560
ISN 0421		PHIE=SQRT(DATAB(7,J3)**2+(.000833*PDOTM)**2+PHIEB*PHIEB+ * PHIESF*PHIESF)	00004570
ISN 0422		GO TO 426	00004580
ISN 0423	424	PHIF=SQRT(DATAB(7,J3)**2+(.000833*PDOTM)**2)	00004600
ISN 0424	426	IF (PHIE .LT. PHIF) GO TO 450	00004610
ISN 0426	440	J3=J3+1	00004620
ISN 0427		IF (J3 .LE. IDB(21)) GO TO 422	00004630
ISN 0429		IPIC(3)=0	00004640
ISN 0430		J2=J2+1	00004650

ISN 0431		IF (J2 .LE. IDB(17)) GO TO 420	00004660
ISN 0433		IPIC(2)=0	00004670
ISN 0434		J2=IDB(16)+1	00004680
ISN 0435		GO TO 414	00004690
	C	ACCEPTABLE COMBINATION FOUND	00004700
ISN 0436	450	ICHOSE(6)=DATAB(1,J3)	00004710
ISN 0437		IPIC(1)=J1	00004720
ISN 0438		IPIC(2)=J2	00004730
ISN 0439		IPIC(3)=J3	00004740
ISN 0440		WT=WT+W*XNNN+NCHOSE(5)*DATAB(23,J2)+NCHOSE(6)*DATAB(23,J3)	00004750
ISN 0441		VOL=VOL+V*XNNN+NCHOSE(5)*DATAB(24,J2)+NCHOSE(6)*DATAB(24,J3)	00004760
ISN 0442		PL=PL+P*XNNN+NCHOSE(5)*DATAB(16,J2)+NCHOSE(6)*DATAB(16,J3)	00004770
ISN 0443		PLMIN=PLMIN+DATAB(16,J1)*XNNN+NCHOSE(5)*DATAB(18,J2)+NCHOSE(6)* * DATAB(18,J3)	00004780
	C	NOW THRUST AND IMPULSI	00004790
ISN 0444		F(1)=(DPHI*DT/57.3+.04*D)*FE/DY	00004800
ISN 0445		F(2)=(DPHI*DT/57.3+.04*D)*FE/DZ	00004810
ISN 0446		F(3)=2./57.3*.04*D*DPHI*FE/DX	00004820
ISN 0447		FF=MAX1(F(1),F(2),F(3))	00004830
ISN 0448		TI=(F(1)+F(2)+F(3))*DI	00004840
		* +XNU*PDJTO/57.3*(XJ/DX+YJ/DY+ZJ/DZ)	00004850
		* +TPRIM*2592000.*(XMD/DX+YMD/DY+ZMD/DZ)	00004860
ISN 0449		FC=FF*DX*DI/(XJ*.4+HIRA)*14.1E-9	00004870
ISN 0450		RETURN	00004880
	C	CONFIGURATION 5	00004890
	C	SELECT FIXED EQUIPMENT	00004900
ISN 0451	500	I1=IDB(15)+1	00004910
ISN 0452		I2=IDB(21)+1	00004920
ISN 0453		ICHOSE(1)=DATAB(1,I1)	00004930
ISN 0454		ICHOSE(2)=DATAB(1,I2)	00004940
ISN 0455		OMEGA=1.1864*10.**8/(24.053*1000.*1000.+6076.*ALT)**1.5	00004950
ISN 0456		DO 502 I=5,9	00004960
ISN 0457	502	ICHOSE(I)=0	00004970
ISN 0458		IF (ITER .GT. 0) GO TO 505	00004980
ISN 0460		DO 504 I=1,9	00004990
ISN 0461	504	NCHOSE(I)=1	00005000
ISN 0462	505	WT=WT+NCHOSE(1)*DATAB(23,I1)+NCHOSE(2)*DATAB(23,I2)	00005010
ISN 0463		VOL=VOL+NCHOSE(1)*DATAB(24,I1)+NCHOSE(2)*DATAB(24,I2)	00005020
ISN 0464		PL=PL+NCHOSE(1)*DATAB(16,I1)+NCHOSE(2)*DATAB(16,I2)	00005030
			00005040

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ISN 0465		PLMIN=PLMIN+NCHOSE(1)*DATAB(18,I1)+NCHOSE(2)*DATAB(18,I2)	00005050
ISN 0466		IERR=0	00005060
ISN 0467		EBEAM=AMIN1(PHIRX,PHIRY)	00005070
ISN 0468		DB=.4*EBEAM	00005080
ISN 0469		IF (DB .LT. .05) DB=.05	00005090
ISN 0471		EAR=EBEAM*EBEAM-EA*EA	00005100
ISN 0472		EHS=(EAR-(EANT*PHIRZ)**2)*.5	00005110
ISN 0473		IF (EHS .LT. 0.) EHS=0.	00005120
ISN 0475		EHS=SQRT(FHS)	00005130
ISN 0476		IF (IPIC(1) .GT. 0) J1=IPIC(1)	00005140
ISN 0478		IF (IPIC(1) .EQ. 0) J1>IDB(I7)+1	00005150
ISN 0480	508	E=SQRT(DATAB(6,J1)**2+DATAB(7,J1)**2+DATAB(8,J1)**2+ *DATAB(11,J1)**2)+SQRT(DATAB(9,J1)**2+DATAB(10,J1)**2)	00005160
ISN 0481		IF (F .LT. EHS) GO TO 512	00005180
ISN 0483	510	J1=J1+1	00005190
ISN 0484		IF (J1 .LE. IDB(18)) GO TO 508	00005200
ISN 0486		ICHOSE(3)=-1	00005210
ISN 0487		ICHOSE(4)=0	00005220
ISN 0488		RETURN	00005230
ISN 0489	512	J2=IPIC(2)	00005240
ISN 0490		IF (J2 .GE. IDB(13) .AND. ITER .EQ. 0) IPIC(2)=0	00005250
ISN 0492		IF (IPIC(2) .EQ. 0) J2=IDB(12)+1	00005260
ISN 0494		IF (ITER .EQ. 0 .AND. IPIC(2) .GT. 0) J2=J2+1	00005270
ISN 0496	515	H=57.3*ZMD*ABS(EANT)/(OMEGA*SQR1(EAR-2.*E*E))	00005280
ISN 0497		IF (DATAB(6,J2) .GE. H) GO TO 520	00005290
ISN 0499		J2=J2+1	00005300
ISN 0500		IF (J2 .LE. IDB(13)) GO TO 515	00005310
ISN 0502		IPIC(2)=0	00005320
ISN 0503		GO TO 510	00005330
ISN 0504	520	ICHOSE(3)=DATAB(1,J1)	00005340
ISN 0505		ICHOSE(4)=DATAB(1,J2)	00005350
ISN 0506		IPIC(1)=J1	00005360
ISN 0507		IPIC(2)=J2	00005370
ISN 0508		IPIC(3)=0	00005380
ISN 0509		WT=WT+NCHOSE(3)*DATAB(23,J1)+NCHOSE(4)*DATAB(23,J2)	00005390
ISN 0510		VOL=VOL+NCHOSE(3)*DATAB(24,J1)+NCHOSE(4)*DATAB(24,J2)	00005400
ISN 0511		PL=PL+NCHOSE(3)*DATAB(16,J1)+NCHOSE(4)*DATAB(16,J2)	00005410
ISN 0512		PLMIN=PLMIN+NCHOSE(3)*DATAB(18,J1)+NCHOSE(4)*DATAB(18,J2)	00005420
ISN 0513		DX=.5*D*COS(ALPHA)	00005430

ISN 0514	FMAX=DB*DATAB(6,J2)*SQRT(XJ/ZJ)/(DI*DX)	00005440
ISN 0515	DZ=.5*D*SIN(ALPHA)	00005450
ISN 0516	DY=.5*D	00005460
ISN 0517	F(1)=(DPHI/57.3*DT+.04*D)*FE/DY	00005470
ISN 0518	F(2)=(DPHI/57.3*DT+.04*D)*FE/DZ	00005480
ISN 0519	F(3)=2./57.3*.04*D*DPHI*FE/DX	00005490
ISN 0520	FMIN=AMAX1(F(1),F(2),F(3))	00005500
ISN 0521	FF=2.*FMIN	00005510
ISN 0522	IF (FF .LT. FMIN) FF=FMIN	00005520
ISN 0524	TI=(F(1)+F(2)+F(3))*DI+	00005530
	* XNU*PDDT0/57.3*(XJ/DX+YJ/DY+ZJ/DZ)+	00005540
	* 37.E6*TPRIM*(FF*DI)**2*2.5*(DX/(XJ*PHIRX)+DY/(YJ*PHIRY))	00005550
	* +XMD*TAUX/DX+YMD*TAUY/DY	00005560
ISN 0525	FC=14.1E-9*FF*DX*DI/(XJ*.4*PHIRX)	00005570
ISN 0526	RETURN	00005580
ISN 0527	END	00005590

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 576 ,PROGRAM SIZE = 18234

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE, &BCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF		
ISN 0002	SUBROUTINE STRUCT(NCONF)	00005600
ISN 0003	DIMENSION NCONF(6)	00005610
ISN 0004	COMMON/USER9/CA,CE	00005620
ISN 0005	COMMON /BTWN/ WT,VOL,DT,SATDAM,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLMIN	00005621
	*LMBDD,ARFA,SATLG,SOARWT,NC,ACSWP,HARWWT,THCMWT,CONVWT,TNKWT,PASST	00005622
	*SATTWT,TPRIM,IBLOC,RADA,RADAB,RAT,HTRPWR,PTRPRB,	00005623
	*HPT,HTPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2),	00005624
	*EQBLG,SABDLG,SATWT	00005625
ISN 0006	COMMON /USER6/EQPF,MBLZSH,EQMIXL,EQM1YL,EQM1ZL,EQM2XL,EQM2YL,	00005626
	*EQM2ZL,ISBOFG,NUMEEO,EEQWT(9),EEQVL(9),EMIYCG,EM1ZCG,EM2YCG,	00005627
	*EM2ZCG,CGEEX(9),EELOC(9),XCGSA1,XCGSA3	00005628
ISN 0007	COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MMDOLD,TRUNC,ITRUNC,DE,TE,	00005629
	*TOULR,QCR,SEIR,PMR,PE,PU,TOULU,QCP,SEIP,PMP,SATR,SATINV,MER,	00005630
	*MEINV,PAYR,PAYINV,PAYQUL,USL,XLTOT,CTOT,FEER,FEEINV,DDTE,XVEST,	00005631
	*OPS,SKTAU(6),RULD(60),T,AN,TS,BS,AM,TF,BF,TC,TA,TB,TOTOPS	00005632
ISN 0008	DATA E,XNU,SIGY,P1/1.E7,.33,3.E4,3.1416/	00005648
ISN 0009	TB= 0.	00005649
ISN 0010	XXNU= 1. - XNU**2	00005650
ISN 0011	ICHECK= 1	00005660
ISN 0012	IF((NCONF(5).EQ.1.OR.NCONF(5).EQ.3.OR.NCONF(5).EQ.5).AND.	00005670
	*XCGSA1.EQ.2) ICHECK= 2	00005680
	ICHECK= 2 MEANS THAT SOLAR ARRAYS ARE PADDLES AND MOUNTED AT	00005700
	C CENTER OF VEHICLE. ICHECK= 1 MEANS OTHERWISE.	00005710
	C	00005720
ISN 0014	XL= EQBLG	00005730
ISN 0015	IF(ICHECK.EQ.2) XL= .5*EQBLG	00005740
ISN 0017	IF(NCONF(5).NE.1.AND.NCONF(5).NE.3.AND.NCONF(5).NE.5) GO TO 1	00005750
	C	00005760
	C SOLAR ARRAYS ARE PADDLES	00005770
	C	00005780
	C APPLIED LOAD (ONLY BENDING MOMENT)	00005790
	C	00005800
	C COMPUTE WEIGHT PER PADDLE (ASSUME 2 PADDLES)	00005810
ISN 0019	WE= .5*SOARWT	00005820
	C	00005830
ISN 0020	XMA= 1.25*SABDLG*WE*SQRT(CA*CA + CE*CE)	00005840
	C	00005850

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	C	NOMINAL TUBE RADIUS	00005860
ISN 0021	C	$R = (SABOLG^{**4} * XMA / (PI^{**5} * E))^{**} .1428$	00005870
	C		00005880
	C	TUBE WALL THICKNESS	00005890
ISN 0022	C	$TW = 2 * \sqrt{XMA / (PI * E * R)}$	00005910
	C		00005920
	C	CHECK FOR APPLICABILITY OF EULER COLUMN STABILITY	00005930
ISN 0023	C		00005940
ISN 0024	C	$FAC1 = (PI * E^{**2} * XMA / (8 * R * SABOLG^{**2}))^{**} .3333$	00005950
	C	IF (SIGY - FAC1.GE.0.) GO TO 1	00005960
	C		00005970
	C	EULER COLUMN STABILITY NOT APPLICABLE	00005980
	C		00005990
ISN 0026	C	$TW = (16 * SIGY * XMA / (PI * E^{**2}))^{**} .3333$	00006000
ISN 0027	C	$R = TW * E / (4 * SIGY)$	00006010
	C		00006020
	C	SIZING OF EQUIPMENT BAY STRUCTURE	00006030
06-6	C		00006040
ISN 0028	C	1 CONTINUE	00006050
	C		00006060
ISN 0029	C	$P = CA * SATWT$	00006070
	C		00006080
	C	BENDING MOMENT	00006090
	C		00006100
	C		00006110
ISN 0030	C	$XM = .75 * CE * EQBLG * SATWT$	00006120
	C		00006130
ISN 0031	C	IF (ICHECK.EQ.1) $XM = CE * EQBLG * SATWT$	00006140
ISN 0033	C	IF (NCONF(6).NE.1) GO TO 3	00006150
	C		00006160
	C	EQUIVALENT AXIAL LOAD	00006170
	C		00006180
ISN 0035	C	$RR = .5 * SATDAM$	00006190
ISN 0036	C	$XN = P / (2 * PI * RR) + XM / (PI * RR * RR)$	00006200
	C		00006210
	C	SIZING OF EQUIVALENT MONOCOQUE CYLINDER	00006220
	C		00006230
	C		00006240

				00006250
ISN 0037			$TM = .672 * (XXNU * XN * XL * XL / E) ** .3333$	00006260
ISN 0038			$FAC2 = XL ** 2 * SQRT (XXNU) / (RR * TM)$	00006270
ISN 0039			IF (FAC2 .LE. 31) GO TO 2	00006280
ISN 0041			$TM = 2.76 * SQRT (SQRT (XXNU) * XN * RR / E)$	00006290
ISN 0042		2	CONTINUE	00006300
	C			00006310
	C		EQUIVALENT THICKNESS OF STIFFENED CYLINDER	00006320
	C			00006330
ISN 0043			$TBAR = .267 * TM$	00006340
	C			00006350
	C		SIZING OF SKIN-STRINGER ASSEMBLY	00006360
	C			00006370
ISN 0044			$T = .44 * TBAR$	00006380
ISN 0045			$TS = 1.9 * T$	00006390
ISN 0046			$BS = .64 * TS * SQRT (E * TBAR / (XXNU * XN))$	00006400
ISN 0047			$B = 1.49 * BS$	00006410
ISN 0048			$N = 1. + 2. * PI * RR / B$	00006420
ISN 0049			$AN = N$	00006430
ISN 0050			$B = 2. * PI * RR / AN$	00006440
ISN 0051			$ALPHA = .745 / XXNU ** .25$	00006450
	C			00006460
	C		SIZING OF CYLINDER FRAMES	00006470
	C			00006480
ISN 0052			$A = E * ALPHA ** 2 * TBAR ** 2 / XN$	00006490
ISN 0053			$RHOF = .0564 * (RR ** 2 / A) * (XN * ALPHA ** 2 / (E * A)) ** .25$	00006500
ISN 0054			$AF = .000785 * XN * RR ** 4 / (E * RHOF ** 2 * A)$	00006510
ISN 0055			$BF = 3.46 * RHOF$	00006520
ISN 0056			$TF = AF / BF$	00006530
ISN 0057			$M = 1. + XL / A$	00006540
ISN 0058			$AM = M$	00006550
ISN 0059			$A = XL / AM$	00006560
	C			00006570
	C		SIZING OF END COVERS	00006580
	C			00006590
ISN 0060			$TC = .352 * SQRT (CA * SATWT / SIGY)$	00006600
ISN 0061			$TA = TC$	00006610
ISN 0062			$XLD = RR$	00006620
ISN 0063			GO TO 4	00006630

ISN 0064	C	3 CONTINUE	00006640
	C		00006650
ISN 0065	C	IF(NCONF(6).NE.2) RETURN	00006660
ISN 0067	C	W= .707*SATDAM	00006670
	C		00006680
	C	EQUIVALENT AXIAL LOAD	00006690
	C		00006700
ISN 0068	C	XN= .25*P/W + .75*XN/W**2	00006710
	C		00006720
	C	SIZING OF EQUIVALENT MONOCOQUE BOX	00006730
	C		00006740
ISN 0069	C	IF(XL/W.LE..5) TM= 1.068*(XXNU*XN*XL*XL/E)**.3333	00006750
ISN 0071	C	IF(XL/W.GT..5) TM= .672*(XXNU*XN*W*W/E)**.3333	00006760
	C		00006770
	C	EQUIVALENT THICKNESS OF STIFFENED BOX	00006780
	C		00006790
ISN 0073	C	TBAR= .267*TM	00006800
	C		00006810
	C	SIZING OF SKIN STRINGER ASSEMBLY	00006820
	C		00006830
ISN 0074	C	T= .44*TBAR	00006840
ISN 0075	C	TS= 1.9*T	00006850
ISN 0076	C	BS= .64*TS*SQRT(E*TBAR/(XXNU*XN))	00006860
ISN 0077	C	B= 1.49*BS	00006870
ISN 0078	C	N= 1. + W/E	00006880
ISN 0079	C	N= 4*N	00006890
ISN 0080	C	AN= N	00006900
ISN 0081	C	B= W/AN	00006910
ISN 0082	C	ALPHA= .745/XXNU**.25	00006920
	C		00006930
	C	SIZING OF FRAMES	00006940
	C		00006950
ISN 0083	C	A= E*ALPHA**2*TBAR**2/XN	00006960
ISN 0084	C	RHOF= .405*(W**2/A)*(XN*ALPHA**2/(E*A))**.25	00006970
ISN 0085	C	AF= .041*XN*W**4/(E*RHOF**2*A)	00006980
ISN 0086	C	BF= 3.464*RHOF	00006990
ISN 0087	C	TF= AF/BF	00007000
	C		00007010
	C		00007020

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ISN 0088		$N = 1. + XL/A$	00007030
ISN 0089		AM = M	00007040
ISN 0090		A = XL/AM	00007050
	C		00007060
	C	SIZING OF END COVERS	00007070
	C		00007080
ISN 0091		$TC = .303 * \sqrt{CA * SATWT / SIGY}$	00007090
ISN 0092		TA = TC	00007100
ISN 0093		$XLD = .5 * W$	00007110
	C		00007120
ISN 0094		4 CONTINUE	00007130
ISN 0095		IF(ICHECK.EQ.1) GO TO 3	00007140
	C		00007150
	C	MID-SECTION BULKHEAD IS REQUIRED	00007160
	C		00007170
ISN 0097		$WL = .455 * CA * SATWT / XLD ** 2$	00007180
ISN 0098		$TB = .859 * XLD * \sqrt{WL / SIGY}$	00007190
	C		00007210
ISN 0099		5 CONTINUE	00007220
	C		00007230
ISN 0100		RETURN	00007240
ISN 0101		END	00007250

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 100 ,PROGRAM SIZE = 2800

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\* 109K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NOECHK,LOAD,NUMAP,NOEDIT,IO,NOXREF		
ISN 0002		SUBROUTINE VEZISE(IERR,NCONF,ICHOSE)
ISN 0003		DIMENSION NCONF(6),EESID(9),EEYCG(9),EEZCG(9),EEINX(9),EEINY(9),
		* FEINZ(9),EEXCG(9)
ISN 0004		COMMON /USER6/EQPF,MBI2SH,EQM1XL,EQM1YL,EQM1ZL,EQM2XL,EQM2YL,
		* EQM2ZL,ISBOFG,NUME G,EEQWT(9),EQVL(9),EM1YCG,EM1ZCG,EM2YCG,
		* EM2ZCG,CGEEX(9),EFLUC(9),XCGSA1,XCGSA3
ISN 0005		COMMON /USER1/EQM1WT,EQM2WT,DIAMAX,ALT
ISN 0006		COMMON /BTWN/STINWT,SATVOL,DT,SATDAM,DX,DY,DZ,SATINX,SATINY,
		* SATINZ,RJ,FF,TL,PL,PLMIN,LMBDD,SOAREA,SATLG,SOARWT,MC,ACSWP,
		* HARMWT,THCMWT,CONVWT,TKNWT,PASSTR,SATTWT,TPRIN,IBTLUC,
		* RADA,KADAB,RAT,HTRPWR,HTRPRB,HPT,HTPIPE,VCHP,HTPT,
		* FC,XNZERO,CUMRT,ACSSM,BITRAT(2),EQBLG,SABOLG,SATWT
ISN 0007		ISHAPE = NCONF(6)
ISN 0008		ISPIN = 0
ISN 0009		RLD=.617
ISN 0010		IF(NCONF(1).EQ.1.OR.NCONF(1).EQ.2) ISPIN = 1
ISN 0012		IFCTYP = 1
ISN 0013		IF(NCONF(5).EQ.1.OR.NCONF(5).EQ.3.OR.NCONF(5).EQ.5) IEQTYP=2
	C	DETERMINE EQUIPMENT BAY EQUIPMENT WEIGHT AND VOLUME
ISN 0015		EQWT= 1.025*(STINWT+ACSWP)
ISN 0016		EQVOL= 1.025*SATVOL
ISN 0017		THCMWT=EQWT-STINWT-ACSWP
	C	THE THERMAL CONTROL SUBSYSTEM IS ACCOUNTED FOR BY THE 1.025 FACTOR
	C	NOTE THAT VOLUMES ARE IN FT**3
	C	
	C	ACCOUNT FOR PACKING FACTOR
	C	
ISN 0018		EQBVOL= 1728.*EQVOL*EQPF
	C	
	C	DETERMINE EQUIPMENT BAY LENGTH
	C	
ISN 0019		ICHOSE=0
ISN 0020		IF(ISHAPE-2)1,2,3
ISN 0021	1	SATDAM= (EQBVOL/(.785*RLD))**.333
ISN 0022		EQBLG=RLD*SATDAM
ISN 0023		IF(SATDAM.LE.DIAMAX) GO TO 4
ISN 0025		SATDAM= DIAMAX

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OF POOR QUALITY

ISN 0026		EQBLG= EQBVOL/ (.785*SATDAM**2).	00000370
ISN 0027		GO TO 4	00000380
ISN 0028	2	EQBLG= (2.*EQBVOL)**.333	00000390
ISN 0029		SATDAM= EQBLG	00000400
ISN 0030		IF(SATDAM.LE.DIAMAX) GO TO 4	00000410
ISN 0032		SATDAM= DIAMAX	00000420
ISN 0033		EQBLG= 2.*EQBVOL/SATDAM**2	00000430
ISN 0034		GO TO 4	00000440
ISN 0035	3	SATDAM= (EQBVOL/.524)**.333	00000450
ISN 0036		EQBLG= SATDAM	00000460
ISN 0037		IF(SATDAM.LE.DIAMAX) GO TO 4	00000470
ISN 0039		ICHOSE=-1	00000480
ISN 0040	C	THAT IS, THIS IS NOT AN ACCEPTABLE MACRO CONFIGURATION	00000490
ISN 0041	4	RETURN	00000500
		CONTINUE	00000510
	C		00000520
	C	DETERMINE SATFLIFE LENGTH	00000530
	C		00000540
ISN 0042		SATLG = EQBLG + EQM1XL + EQM2XL	00000550
	C	DETERMINE SOLAR ARRAY DIMENSIONS	00000560
	C		00000570
ISN 0043		IERR=0	00000580
ISN 0044		SAAREA = 144.*SCAREA	00000590
ISN 0045		IF(IEQTYP.EQ.2) GO TO 54	00000600
ISN 0047		IF(ISHAPE-2) 51,52,53	00000610
ISN 0048	51	SA3XL= SAAREA/SATDAM	00000620
ISN 0049		IF(SA3XL.LE.EQBLG) GO TO 55	00000630
ISN 0051		IERR=IERR+1	00000640
ISN 0052		GO TO 55	00000650
ISN 0053	52	SA3XL= 1.414*SAAREA/SATDAM	00000660
ISN 0054		IF(SA3XL.LE.EQBLG) GO TO 55	00000670
ISN 0056		IERR=IERR+1	00000680
ISN 0057		GO TO 55	00000690
ISN 0058	53	SA3XL= SQRT(1.273*SAAREA)	00000700
ISN 0059		IF(SA3XL.LE.SATDAM) GO TO 55	00000710
ISN 0061		IERR=IERR+1	00000720
ISN 0062		GO TO 55	00000730
ISN 0063	54	SA1YL= .005208*SAAREA	00000740
ISN 0064		SA1XL= 96.	00000750

ISN 0065		SAIZL= 1.	00000760
ISN 0066		SA2YL= SAIYL	00000770
ISN 0067		SA2XL= SAIXL	00000780
ISN 0068		SAZZL= SAIZL	00000790
ISN 0069	55	CONTINUE	00000800
	C		00000810
	C	DETERMINE EQUIPMENT BAY STRUCTURAL WEIGHT	00000820
	C		00000830
ISN 0070		FQBSTR= .218*EQWT** .986*(EQBLG/SATDAM)** .263	00000840
ISN 0071		IF (IEQTYP.EQ.2) FQBSTR= .59*FQBSTR	00000850
ISN 0073		EQBWT= 1.1*EQWT + FQBSTR	00000860
	C		00000870
	C	DETERMINE MISSION EQUIPMENT BAY STRUCTURAL WEIGHT	00000880
	C		00000890
ISN 0074		IF (MB12SH.EQ.2) GO TO 5	00000900
ISN 0076		EQM1ST = .218*EQM1WT** .986*(EQM1XL/SATDAM)** .263	00000910
ISN 0077		EQM2ST = .218*EQM2WT** .986*(EQM2XL/SATDAM)** .263	00000920
ISN 0078		GO TO 14	00000930
96-6 ISN 0079	5	IFLAG= 1	00000940
ISN 0080		IF (EQM1YL.GT. EQM1XL) IFLAG= 2	00000950
ISN 0082		IF ((IFLAG.EQ.1.AND. EQM1ZL.GT. EQM1XL).OR. (IFLAG.EQ.2.AND. EQM1ZL.GT. EQM1YL)) IFLAG= 3	00000960
ISN 0084		IF (IFLAG=2) 6,7,8	00000970
ISN 0085	6	EM1LNG= EQM1XL	00000980
ISN 0086		EM1DIA= SQRT(EQM1YL**2 + EQM1ZL**2)	00000990
ISN 0087		GO TO 9	00001000
ISN 0088	7	EM1LNG= EQM1YL	00001020
ISN 0089		EM1DIA= SQRT(EQM1XL**2 + EQM1ZL**2)	00001030
ISN 0090		GO TO 9	00001040
ISN 0091	8	EM1LNG= EQM1ZL	00001050
ISN 0092		EM1DIA= SQRT(EQM1XL**2 + EQM1YL**2)	00001060
ISN 0093	9	CONTINUE	00001070
ISN 0094		EQM1ST= .218*EQM1WT** .986*(EM1LNG/EM1DIA)** .263	00001080
ISN 0095		IFLAG= 1	00001090
ISN 0096		IF (EQM2YL.GT. EQM2XL) IFLAG= 2	00001100
ISN 0098		IF ((IFLAG.EQ.1.AND. EQM2ZL.GT. EQM2XL).OR. (IFLAG.EQ.2.AND. EQM2ZL.GT. EQM2YL)) IFLAG= 3	00001110
		IF (IFLAG=2) 10,11,12	00001120
ISN 0100			00001130
ISN 0101	10	EM2LNG= EQM2XL	00001140

ISN 0102	EM2DIA= SQRT(EQM2YL**2 + EQM2ZL**2)	00001150
ISN 0103	GO TO 13	00001160
ISN 0104	11 EM2LNG= EQM2YL	00001170
ISN 0105	EM2DIA= SQRT(EQM2XL**2 + EQM2ZL**2)	00001180
ISN 0106	GO TO 13	00001190
ISN 0107	12 EM2LNG= EQM2ZL	00001200
ISN 0108	EM2DIA= SQRT(EQM2XL**2 + EQM2YL**2)	00001210
ISN 0109	13 CONTINUE	00001220
ISN 0110	EQM2ST= .218*EQM2WT** .986*(EM2LNG/EM2DIA)** .263	00001230
ISN 0111	14 CONTINUE	00001240
	C	00001250
	C	00001260
	C	00001270
ISN 0112	EQM1ST= EQM1ST + .1*EQMIWT	00001280
ISN 0113	EQM2ST= EQM2ST + .1*EQM2WT	00001290
	C	00001300
	C	00001310
	C	00001320
ISN 0114	IF(MB12SH.EQ.2) GO TO 150	00001330
ISN 0116	EQM1VL= .785*EQM1YL**2*EQM1XL	00001340
ISN 0117	EQM2VL= .785*EQM2YL**2*EQM2XL	00001350
ISN 0118	GO TO 151	00001360
ISN 0119	150 CONTINUE	00001370
ISN 0120	EQM1VL= EQM1XL*EQM1YL*EQM1ZL	00001380
ISN 0121	EQM2VL= EQM2XL*EQM2YL*EQM2ZL	00001390
ISN 0122	151 CONTINUE	00001400
ISN 0123	EQMVOL= EQM1VL + EQM2VL	00001410
	C	00001420
	C	00001430
	C	00001440
ISN 0124	SA3WT = SJARWT	00001450
ISN 0125	IF(TEQTYP.EQ.1) GO TO 152	00001460
ISN 0127	SA1WT = .5*SJARWT	00001470
ISN 0128	SA2WT = SA1WT	00001480
ISN 0129	152 CONTINUE	00001490
	C	00001500
	C	00001510
	C	00001520
ISN 0130	SABOLG= 0.	00001530



ISN 0131		SABOOM= 0.	00001540
ISN 0132		SADRIV= 0.	00001550
ISN 0133		IF(1SPIN.EQ.1) GO TO 23	00001560
ISN 0135		SABDLG= 24.	00001570
ISN 0136		SABOOM= 15.2	00001580
ISN 0137		IF(1SBOFG.EQ.0) GO TO 23	00001590
ISN 0139		SADRIV= .166*(SA1WT + SA2WT)	00001600
ISN 0140	23	CONTINUE	00001610
ISN 0141		SABMWT= SABOOM + SADRIV	00001620
	C		00001630
	C	CALCULATE HARNESS AND STRUCTURAL TPS WEIGHT	00001640
	C		00001650
	C	FIRST NEED MISSION EQUIPMENT WEIGHT AND EXTERNAL EQUIPMENT WEIGHT	00001660
	C	AND VOLUME	00001670
	C		00001680
	C		00001690
ISN 0142		EQMWT= EQM1WT+ EQM2WT	00001700
ISN 0143		EEQTWT= 0.	00001710
ISN 0144		EEQVOL= 0.	00001720
ISN 0145		IF(NUMEEQ.EQ.0) GO TO 232	00001730
ISN 0147		DO 231 I=1,NUMEEQ	00001740
ISN 0148		EEQTWT= EEQTWT + EEQWT(I)	00001750
ISN 0149		EEQVOL= EEQVOL + EEQVL(I)	00001760
ISN 0150	231	CONTINUE	00001770
ISN 0151	232	CONTINUE	00001780
	C		00001790
ISN 0152		HARNWT= .013*(STINWT+EEQTWT+ * EQMWT)**1.31*(EQBVOL + EQMVOL + EEQVOL)**.16/4.296	00001800
	C		00001810
	C	DETERMINE STRUCTURAL THERMAL PROTECTION SYSTEM WEIGHT	00001820
	C		00001830
ISN 0153		STTPS= .025*EQBSTP	00001840
	C		00001850
	C	DETERMINE SATELLITE DRY WEIGHT LESS AUXILIARY PROPULSION DRY	00001860
	C	WEIGHT	00001870
	C		00001880
	C	FIRST DETERMINE SOLAR ARRAY WEIGHT	00001890
	C		00001900
ISN 0154		SOARWT= 0.	00001910
			00001920

ISN 0155		IF(IEQTYP.EQ.2) GO TO 233	00001930
ISN 0157		SOARWT= SA3WT	00001940
ISN 0158		GO TO 234	00001950
ISN 0159	233	SOARWT= SA1WT + SA2WT	00001960
ISN 0160	234	CONTINUE	00001970
	C		00001980
ISN 0161		PASSTR=EQBWT+EQM1ST+EQM2ST+SABOOM+SADRIV+STTPS	00001990
ISN 0162		SUBWT1= EQMWT + EQM1ST + EQM2ST + SOARWT + EEQTWT + SABMWT	00002000
ISN 0163		SUBWT2= SUBWT1 + EQWT - ACSWP + HARNWT + STTPS + EQBSTR	00002010
ISN 0164		CONTIN= .15*SUBWT2	00002020
ISN 0165		SUBWT= SUBWT2 + CONTIN	00002030
ISN 0166		DRYWT= SUBWT	00002040
	C		00002050
	C	DETERMINE SATELLITE GROSS WEIGHT	00002060
	C		00002070
ISN 0167		SATWT= DRYWT + ACSWP	00002080
	C		00002090
	C	DETERMINE ADAPTER WEIGHT	00002100
	C		00002110
ISN 0168		SATADP= .012*SATWT	00002120
	C		00002130
	C	DETERMINE SATELLITE LAUNCH WEIGHT	00002140
	C		00002150
ISN 0169		SATTWT= SATWT + SATADP	00002160
	C		00002170
	C	CENTER OF GRAVITY CALCULATIONS	00002180
	C		00002190
ISN 0170		EBXCG= 500. + .5*EQBLG	00002200
ISN 0171		EBYCG= 0.	00002210
ISN 0172		EBZCG= 0.	00002220
	C		00002230
	C	MISSION EQUIPMENT AND MISSION EQUIPMENT BAY STRUCTURE C.G.	00002240
	C		00002250
ISN 0173		EM1XCG= 500. + EQBLG + .5*EQM1XL	00002260
ISN 0174		EM2XCG= 500. - .5*EQM2XL	00002270
	C		00002280
	C	EQUIPMENT BAY STRUCTURE C.G.	00002290
	C		00002300
ISN 0175		STRXCG= 500. + .5*EQBLG	00002310

ISN 0176	STRYCG= 0.	00002320
ISN 0177	STRZCG= 0.	00002330
	C	00002340
	C	00002350
ISN 0178	EXTERNAL EQUIPMENT C.G.	00002360
ISN 0180	IF(NUMEEQ.EQ.0) GO TO 240	00002370
ISN 0181	DO 239 I=1,NUMEEQ	00002380
ISN 0182	EECID(I)= (1728.*EEQVL(I))*#.333	00002390
ISN 0183	IF(CGEEEX(I)-2.) 235,236,237	00002400
ISN 0184	235 FEXCG(I)= 500. + .5*EQBLG	00002410
ISN 0185	GO TO 238	00002420
ISN 0186	236 FEXCG(I)= 500. + .5*EQBLG	00002430
ISN 0187	GO TO 238	00002440
ISN 0188	237 FEXCG(I)= 500.	00002450
ISN 0189	238 CONTINUE	00002460
ISN 0190	EEYCG(I)= 0.	00002470
ISN 0191	EEZCG(I)= 0.	00002480
ISN 0193	IF(EELOC(I).EQ.1.) EEYCG(I)= .5*(SATDAM + EESID(I))	00002490
ISN 0195	IF(EELOC(I).EQ.2.) EEYCG(I)= -.5*(SATDAM + EESID(I))	00002500
ISN 0197	IF(EELOC(I).EQ.3.) EEZCG(I)= -.5*(SATDAM + EESID(I))	00002510
ISN 0199	IF(EELOC(I).EQ.4.) EEZCG(I)= .5*(SATDAM + EESID(I))	00002520
ISN 0200	239 CONTINUE	00002530
	240 CONTINUE	00002540
	C	00002550
	C	00002560
	C	00002570
ISN 0201	SOLAR ARRAY C.G.S	00002580
ISN 0203	IF(IEQTYE.EQ.2) GO TO 244	00002590
ISN 0204	SA3YCG= 0.	00002600
ISN 0205	SA3ZCG= 0.	00002610
ISN 0206	IF(XLGSAB-2.) 241,242,243	00002620
ISN 0207	241 SA3XCG= 500. + EQBLG	00002630
ISN 0208	GO TO 249	00002640
ISN 0209	242 SA3XCG= 500. + .5*EQBLG	00002650
ISN 0210	GO TO 249	00002660
ISN 0211	243 SA3XCG= 500.	00002670
ISN 0212	GO TO 249	00002680
ISN 0213	244 CONTINUE	00002690
ISN 0214	IF(XLGSAA-2.) 245,246,247	00002700
ISN 0215	245 SA1XCG= 500. + EQBLG	
	GO TO 248	

ISN 0216	246	SAIXCG= 500. + .5*EQBLG	00002710
ISN 0217		GO TO 248	00002720
ISN 0218	247	SAIXCG= 500.	00002730
ISN 0219	248	CONTINUE	00002740
ISN 0220		SA2XCG= SAIXCG	00002750
ISN 0221		SA1YCG= 24. + .5*(SATDAM. + SA1YL)	00002760
ISN 0222		SA2YCG= -SA1YCG	00002770
ISN 0223		SA1ZCG= 0.	00002780
ISN 0224		SA2ZCG= 0.	00002790
ISN 0225		SABXCG= SAIXCG	00002800
ISN 0226		SABYCG= 0.	00002810
ISN 0227		SABZCG= 0.	00002820
ISN 0228	249	CONTINUE	00002830
	C		00002840
	C	SATELLITE CENTER OF GRAVITY CALCULATIONS	00002850
	C		00002860
	C	FIRST DETERMINE CONTRIBUTION OF SOLAR ARRAYS	00002870
	C		00002880
ISN 0229		IF (T+Q TYP. EQ. 2) GO TO 250	00002890
ISN 0231		SAX= SA3WT*SA2XCG	00002900
ISN 0232		SAY= SA2WT*SA2YCG	00002910
ISN 0233		SAZ= SA3WT*SA2ZCG	00002920
ISN 0234		GO TO 251	00002930
ISN 0235	250	CONTINUE	00002940
ISN 0236		SAX= SA1WT*SA1XCG + SA2WT*SA2XCG + SABMWT*SABXCG	00002950
ISN 0237		SAY= SA1WT*SA1YCG + SA2WT*SA2YCG + SABMWT*SABYCG	00002960
ISN 0238		SAZ= SA1WT*SA1ZCG + SA2WT*SA2ZCG + SABMWT*SABZCG	00002970
ISN 0239	251	CONTINUE	00002980
	C		00002990
	C	NEXT DETERMINE CONTRIBUTION OF EXTERNAL EQUIPMENT	00003000
	C		00003010
ISN 0240		EEX=0.	00003020
ISN 0241		E EY=0.	00003030
ISN 0242		EEZ=0.	00003040
ISN 0243		IF (NUMLEG. EQ. C) GO TO 253	00003050
ISN 0245		DO 252 I=1, NUML Q	00003060
ISN 0246		EEX= EEX + EFWWT(I)*EEEXCG(I)	00003070
ISN 0247		E EY= E EY + EFWWT(I)*EE EYCG(I)	00003080
ISN 0248		EEZ= EEZ + E EFWWT(I)*EE E ZCG(I)	00003090

ISN 0249	252	CONTINUE		00003100
ISN 0250	253	CONTINUE		00003110
			C	
ISN 0251		SATXCG = (EQBST*STRXCG + EQWT*EBXCG + (EQM1ST + EQM1WT)*EM1XCG +		00003120
		1 (EQM2ST + EQM2WT)*EM2XCG + SAX + FEX +		00003130
		2 (HARNWT + STTPS)*EBXCG)/(SATWT - CONTIN)		00003140
			C	00003150
ISN 0252		SATYCG = (EQBST*STRYCG + EQWT*EBYCG + (EQM1ST + EQM1WT)*EM1YCG +		00003160
		1 (EQM2ST + EQM2WT)*EM2YCG + SAY + EY +		00003170
		2 (HARNWT + STTPS)*EBYCG)/(SATWT - CONTIN)		00003180
			C	00003190
ISN 0253		SATZCG = (EQBST*STRZCG + EQWT*EBZCG + (EQM1ST + EQM1WT)*EM1ZCG +		00003200
		1 (EQM2ST + EQM2WT)*EM2ZCG + SAZ + EEZ +		00003210
		2 (HARNWT + STTPS)*EBZCG)/(SATWT - CONTIN)		00003220
			C	00003230
		CALCULATE MOMENTS OF INERTIA		00003240
			C	00003250
		FIRST DETERMINE EQUIPMENT BAY STRUCTURE AND EQUIPMENT BAY		00003260
		EQUIPMENT INCREMENTAL INERTIA		00003270
			C	00003280
			C	00003290
ISN 0254		SATRAD = .5*SATDAM		00003300
ISN 0255		IF (ISHAPE - 2) 66, 67, 68		00003310
ISN 0256	66	STRINX = EQBST*SATRAD**2		00003320
ISN 0257		STRINY = .5*(EQBST*(SATRAD**2 + .167*EQBLG**2)		00003330
ISN 0258		STRINZ = STRINY		00003340
ISN 0259		EQINX = .5*EQWT*SATRAD**2		00003350
ISN 0260		EQINY = .0833*EQWT*(3.*SATRAD**2 + EQBLG**2)		00003360
ISN 0261		EQINZ = EQINY		00003370
ISN 0262		GO TO 69		00003380
ISN 0263	67	EQBSID = .708*SATDAM		00003390
ISN 0264		STRINX = .333*EQBST*EQBSID**2		00003400
ISN 0265		STRINY = .0833*EQBST*(2.*EQBSID**2 + EQBLG**2)		00003410
ISN 0266		STRINZ = STRINY		00003420
ISN 0267		EQINX = .17*EQWT*EQBSID**2		00003430
ISN 0268		EQINY = .0833*EQWT*(EQBSID**2 + EQBLG**2)		00003440
ISN 0269		EQINZ = EQINY		00003450
ISN 0270		GO TO 69		00003460
ISN 0271	68	STRINX = .107*EQBST*SATDAM**2		00003470
ISN 0272		STRINY = STRINX		00003480

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ISN 0273	STRINZ= STRINX	00003490
ISN 0274	EQINX= .1*EQWT*SATDAM**2	00003500
ISN 0275	EQINY= EQINX	00003510
ISN 0276	FQINZ= FQINX	00003520
ISN 0277	09 CONTINUE	00003530
ISN 0278	IF (NUMEEO .EQ. 0) GO TO 71	00003535
	C	00003540
	C	00003550
	C	00003560
ISN 0280	DO 70 I=1,NUMEEO	00003570
ISN 0281	FEINX(I)= .167*FEQWT(I)*FESID(I)**2	00003580
ISN 0282	FEINY(I)= FEINX(I)	00003590
ISN 0283	FEINZ(I)= FEINX(I)	00003600
ISN 0284	70 CONTINUE	00003610
ISN 0285	71 CONTINUE	00003615
	C	00003620
	C	00003630
	C	00003640
ISN 0286	IF (IEQTP.EQ.2) GO TO 37	00003650
ISN 0288	SA3INX= SA3WT*SATRAD**2	00003660
ISN 0289	SA3INY= .5*SA3WT*(SATRAD**2 + .167*SA3XL**2)	00003670
ISN 0290	SA3INZ= SA3INY	00003680
ISN 0291	GO TO 38	00003690
ISN 0292	07 SA1INX= .0833*SA1WT*(SA1YL**2 + SA1ZL**2)	00003700
ISN 0293	SA1INY= .0833*SA1WT*(SA1XL**2 + SA1ZL**2)	00003710
ISN 0294	SA1INZ= .0833*SA1WT*(SA1XL**2 + SA1YL**2)	00003720
ISN 0295	SA2INX= .0833*SA2WT*(SA2YL**2 + SA2ZL**2)	00003730
ISN 0296	SA2INY= .0833*SA2WT*(SA2XL**2 + SA2ZL**2)	00003740
ISN 0297	SA2INZ= .0833*SA2WT*(SA2XL**2 + SA2YL**2)	00003750
ISN 0298	38 CONTINUE	00003760
	C	00003770
	C	00003780
	C	00003790
ISN 0299	IF (MB12SH.EQ.2) GO TO 39	00003800
ISN 0301	EM1INX= .5*(EQM1ST + EQM1WT) * SATRAD**2	00003810
ISN 0302	EM1INY= .0833*(EQM1ST + EQM1WT)*(3*SATRAD**2 + EQM1XL**2)	00003820
ISN 0303	EM1INZ= EM1INY	00003830
ISN 0304	EM2INX= .5*(EQM2ST + EQM2WT)*SATRAD**2	00003840
ISN 0305	EM2INY= .0833*(EQM2ST + EQM2WT)*(3*SATRAD**2 + EQM2XL**2)	00003850

ISN 0306	EMZINZ= EMZINY	00003860
ISN 0307	GO TO 40	00003870
ISN 0308	39 TEM1= .0833*(EQM1ST + EQM1WT)	00003880
ISN 0309	TEM2= .0833*(EQM2ST + EQM2WT)	00003890
ISN 0310	EM1YNX= TEM1*(EQM1YL**2 + EQM1ZL**2)	00003900
ISN 0311	EM1INY= TEM1*(EQM1ZL**2 + EQM1XL**2)	00003910
ISN 0312	EM1INZ= TEM1*(EQM1YL**2 + EQM1XL**2)	00003920
ISN 0313	EM2YNX= TEM2*(EQM2YL**2 + EQM2ZL**2)	00003930
ISN 0314	EM2INY= TEM2*(EQM2ZL**2 + EQM2XL**2)	00003940
ISN 0315	EM2INZ= TEM2*(EQM2YL**2 + EQM2XL**2)	00003950
ISN 0316	40 CONTINUE	00003960
ISN 0317	EQM1TO= EQM1WT + EQM1ST	00003970
ISN 0318	EQM2TO= EQM2WT + EQM2ST	00003980
	SATELLITE TOTAL INERTIA CALCULATIONS	00003990
	FIRST DETERMINE CONTRIBUTION OF SOLAR ARRAYS	00004000
	IF (IEGTYP.EQ.2) GO TO 41	00004010
ISN 0319	SA1X= SA3INX + SA3WT*((SATYCG-SA3YCG)**2 + (SATZCG-SA2ZCG)**2)	00004020
ISN 0321	SA1Y= SA3INY + SA3WT*((SATZCG-SA2ZCG)**2 + (SATXCG-SA3XCG)**2)	00004030
ISN 0322	SA1Z= SA3INZ + SA3WT*((SATYCG-SA3YCG)**2 + (SATXCG-SA3XCG)**2)	00004040
ISN 0323	GO TO 42	00004050
ISN 0324	41 CONTINUE	00004060
ISN 0325	SA1X= SA1INX + SA1WT*((SATYCG-SA1YCG)**2 + (SATZCG-SA1ZCG)**2) +	00004070
ISN 0326	1 SA2INX + SA2WT*((SATYCG-SA2YCG)**2 + (SATZCG-SA2ZCG)**2)	00004080
	2 + SABMWT*((SATYCG-SA3YCG)**2 + (SATZCG-SABZCG)**2)	00004090
ISN 0327	SA1Y= SA1INY + SA1WT*((SATZCG-SA1ZCG)**2 + (SATXCG-SA1XCG)**2) +	00004100
	1 SA2INY + SA2WT*((SATZCG-SA2ZCG)**2 + (SATXCG-SA2XCG)**2)	00004110
	2 + SABMWT*((SATZCG-SABZCG)**2 + (SATXCG-SABXCG)**2)	00004120
ISN 0328	SA1Z= SA1INZ + SA1WT*((SATYCG-SA1YCG)**2 + (SATXCG-SA1XCG)**2) +	00004130
	1 SA2INZ + SA2WT*((SATYCG-SA2YCG)**2 + (SATXCG-SA2XCG)**2)	00004140
	2 + SABMWT*((SATYCG-SA3YCG)**2 + (SATXCG-SABXCG)**2)	00004150
ISN 0329	42 CONTINUE	00004160
	NEXT DETERMINE CONTRIBUTION OF EXTERNAL EQUIPMENT	00004170
ISN 0330	EE1X= 0.	00004180
		00004190
		00004200
		00004210
		00004220
		00004230
		00004240

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ISN 0331      EEIY= 0.                                00004250
ISN 0332      EEIZ= 0.                                00004260
ISN 0333      IF(NUMEEQ.EQ.0) GO TO 44                00004270
ISN 0334      DO 42 I=1,NUMEEQ                        00004280
ISN 0336      EEIX= EEIX + I*INX(I) + EEQWT(I)*((SATYCG-EEYCG(I))**2 +
* (SATZCG-EEZCG(I))**2)                             00004290
ISN 0337      FFIY= FFIY + F*INY(I) + EEQWT(I)*((SATZCG-EEZCG(I))**2 +
* (SATXCG-EEYCG(I))**2)                             00004300
ISN 0338      EEIZ= EEIZ + I*INZ(I) + EEQWT(I)*((SATYCG-EEYCG(I))**2 +
* (SATXCG-EEZCG(I))**2)                             00004320
ISN 0339      43 CONTINUE                             00004330
ISN 0340      44 CONTINUE                             00004340
C                                                    00004350
ISN 0341      SATINX= STRINX + EQBSTR*((SATYCG-STRYCG)**2 + (SATZCG-STRZCG)**2)
1 + LMIINX + EQM1TO*((SATYCG-EMIYCG)**2 + (SATZCG-EMIZCG)**2) 00004360
2 + FMZINX + EQM2TO*((SATYCG-EMZYCG)**2 + (SATZCG-EMZZCG)**2) 00004370
3 + IQINX + EQWT*(SATYCG**2 + SATZCG**2) + SAIX + EEIX 00004380
C                                                    00004390
ISN 0342      SATINY= STRINY + EQBSTR*((SATZCG-STRZCG)**2 + (SATXCG-STRXCG)**2)
1 + FMIINY + EQM1TO*((SATZCG-EMIZCG)**2 + (SATXCG-EMIXCG)**2) 00004400
2 + FMZINY + EQM2TO*((SATZCG-EMZZCG)**2 + (SATXCG-EMZXCG)**2) 00004410
3 + IQINY + EQWT*(SATZCG**2 + (SATXCG-STRXCG)**2) + SAIY + EEIY 00004420
C                                                    00004430
ISN 0343      SATINZ= STRINZ + EQBSTR*((SATYCG-STRYCG)**2 + (SATXCG-STRXCG)**2)
1 + LMIINZ + EQM1TO*((SATYCG-EMIYCG)**2 + (SATXCG-EMIXCG)**2) 00004440
2 + FMZINZ + EQM2TO*((SATYCG-EMZYCG)**2 + (SATXCG-EMZXCG)**2) 00004450
3 + EQINZ + EQWT*(SATYCG**2 + (SATXCG-STRXCG)**2) + SAIZ + EEIZ 00004460
C                                                    00004470
C                                                    00004480
C COMPUTE DISTANCE FROM C.G. TO MAIN ENGINE(DT), GAS JET LEVER ARMS
C ON ROLL, PITCH, AND YAW AXES, RESPECTIVELY, (DX,DY,DZ). THE
C CONVERSION TO UNITS OF FT IS DONE IN SUBROUTINE SANDC
C                                                    00004490
ISN 0344      IF(I$SHAPE-2) 45,46,46                00004500
ISN 0345      45 DT= SATXCG - 500.                    00004510
ISN 0346      DX= .5*EQBLG                            00004520
ISN 0347      DY= DX                                    00004530
ISN 0348      DZ= .5*SATDAM                            00004540
ISN 0349      GO TO 47                                00004550
ISN 0350      46 DT= SATXCG - 500.                    00004560
                                                    00004570
                                                    00004580
                                                    00004590
                                                    00004600
                                                    00004610
                                                    00004620
                                                    00004630

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ISN 0351      DX= .5*SATDAM
ISN 0352      DY= DX
ISN 0353      DZ=DX
ISN 0354      GO TO 47
ISN 0355      48 DT=.5*EQBLG
ISN 0356      DX=.5*EQBSID
ISN 0357      DY=DT
ISN 0358      DZ=DT
ISN 0359      47 RJ=SATINX
ISN 0360      RETURN
ISN 0361      END

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00004640
00004650
00004659
00004660
00004661
00004662
00004663
00004664
00004664
00004680
00004690
00004700

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\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINFCNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCL,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 360 ,PROGRAM SIZE = 6982

\*STATISTICS\* NO DIAGNOSTICS GENERATION

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

65K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
 SOURCE1,ECCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,IO,NOXREF  
 SUBROUTINE EP (IPIC,IERA,ITLK,NCONF,ICHOSE,NCHOSE)

ISN 0002

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C *****00004710
C * SUBROUTINE EP - - *00004720
C * WILL SELECT AND SIZE THE ELECTRICAL SUBSYSTEM WHICH WILL BE *00004730
C * THESE CONFIGURATIONS AS FOLLOWS - - *00004740
C * NCONF (1) = 1 IS DUAL SPIN *00004750
C * NCONF (1) = 2 IS YAW SPIN *00004760
C * NCONF (1) = 3 IS MASS EXPULSION *00004770
C * NCONF (1) = 4 IS MASS EXPULSION(MOMENTUM BIAS) *00004780
C * NCONF (1) = 5 IS FITCH MOMENTUM BIAS *00004790
C * NCONF (5) = 1 IS SHUNT - PADDLL *00004810
C * NCONF (5) = 2 IS SHUNT - BODY *00004820
C * NCONF (5) = 3 IS S + D - PADDLE *00004830
C * NCONF (5) = 4 IS S + D - BODY *00004840
C * NCONF (5) = 5 IS SERIES PADDLE *00004850
C * NCONF (5) = 6 IS SERIES BODY *00004860
C * NCONF (6) = 1 IS CYLINDER *00004870
C * NCONF (6) = 2 IS BOX *00004880
C * NCONF (6) = 3 IS SPHERE *00004890
C *****00004900
C *****00004910
C * A LIST OF THE VARIABLES FOLLOWS - - *00004920
C * *00004930
C * VARIABLE HOW USED FROM TO DEFAULT DESCRIPTION*00004940
C * *00004950
C * A INT EP FP FT HE + HP *00004960
C * A1 INT EPS FPS FT**2 ARRAY AREA*00004970
C * A32 INT EP EP A**(3/2) *00004980
C * ALT I,INT USER EPR MI ALTITUDE *00004990
C * ARFA 0 EPS VESIZE FT**2 ARRAY AREA*00005000
C * CA INT EPS EPS A-H MIN REQ CP*00005010
C * CAPMAX INT DB EPS A-H MIN REQ CP*00005020
C * CELL INT DB LPS A-H CAP SEL CL*00005030
C * CHMINT INT EPS EPS 2.0 HRS MIN CHG TM*00005040
C * CI INT LPS EPS A-HMIN INST CP*00005050
C * CISTAR INT EPS FPS A-HCAP SEL GEL*00005060
C * CR INT EPS EPS W-HMIN REQ CAP*00005070

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C *	DATAB	I,INT,0	MAIN	EPR,EPS		DATA BASE	*00005080
C *	DELF	INT	EPS	EPS	.03	XMIS LOSS	*00005090
C *	DELI	INT	EPS	EPS	.02	FAB LOSS	*00005100
C *	DELM	INT	EPS	EPS	.01	MISC LOSS	*00005110
C *	DFLR	INT	EPS	EPS	.05 DK	RAD DEG FAC	*00005120
C *	DELT	INT	EPS	EPS	TABLE	TEMP CORR.	*00005130
C *	ETAC	INT	DE	EPK	1.0	EFF CHGK	*00005140
C *	FTAD	INT	DB	EPR,EPS	0.85	EFF DISCH	*00005150
C *	ETAL	INT	DB	EPR,EPS	0.65	EFF BATT	*00005160
C *	ETAI	INT	EPS	EPS	0.105	SOLAR CL EF	*00005170
C *	ETALR	INT	DB	EPK	0.40	EFF LD REG	*00005180
C *	TAR	INT	EPR	EPR,EPS	1.0	PWR DIST LS	*00005190
C *	FS	INT	EPS	EPS	-	SIZE FACT.	*00005200
C *	FW	INT	EPS	EPS	-	WT FACTOR	*00005210
C *	HE	INT	LP	EP	20.902E6FT	RAD EARTH	*00005220
C *	HEDA	INT	EP	EP		HE/A	*00005230
C *	HP	INT	EP	EP		FT PERIGEE	*00005240
C *	I	INT	EP	EP		INT INDEX	*00005250
C *	ICCN	INT	EPK	FPR		CCU INDEX	*00005260
C *	ICFL	INT	EPS	EPS		COL INDX CL	*00005270
C *	ICELLE	INT	EPS	EPS		END CELLS	*00005280
C *	ICH	INT	EPR	LPR		AMP CHG CURR	*00005290
C *	ICHGR	INT	EPR	EPR		COL INDX CH	*00005300
C *	ICHGRL	INT	EPS	EPS		END CHGRS	*00005310
C *	ICHOSF	U	EPR,EPS	MAIN		HDWR ID	*00005320
C *	ICUNF	INT	EPR,EPS	EPR,EPS		VAR ON CONF	*00005330
C *	IDF	I	MAIN	EPR,EPS		LAST HDWR	*00005340
C *	IDR	INT	EPK	EPK		CUL INDX IR	*00005350
C *	IDRE	INT	EPR	EPR		END DISCH	*00005360
C *	IERR	0	EPR	MAIN		ERROR FLG	*00005370
C *	ILR	INT	EPK	EPK		CUL INDX LK	*00005380
C *	ILRE	INT	EPK	EPK		END LR	*00005390
C *	IPCU	INT	LPR	EPK		PCU INDLX	*00005400
C *	IPCUL	INT	LPR	EPR		END PCU	*00005410
C *	IPD	INT	EPR	EPR		PD INDEX	*00005420
C *	IPDE	INT	EPK	EPK		END PD	*00005430
C *	IPIC	I,0	EPR,EPS	MAIN		HDWR INDEX	*00005440
C *	ISPD	INT	EPK	EPK		SPD INDEX	*00005450
C *	ISPDE	INT	EPK	EPK		END SPD	*00005460

C *	ISR1	INT	EPR	EPR		SR1 INDEX	*00005470
C *	ISR1E	INT	EPR	EPR		END SR1	*00005480
C *	ISR2	INT	EPR	EPR		SR2 INDEX	*00005490
C *	ISR2E	INT	EPR	EPR		END SR2	*00005500
C *	K1	INT	EPS	EPS	1.02	BATT PKG F	*00005510
C *	K2	INT	EPS	EPS	1.4	BAT ST WT F	*00005520
C *	LMBDD	INT,0	EPR	EPR,REL	0.3	AV DP DISCH	*00005530
C *	LMBDG	INT	EPS	EPS	-	ORINT FACT	*00005540
C *	LMBDP	INT	EPS	EPS	0.9	SLR PKG FAC	*00005550
C *	MU	INT	EP	EP	1.408E16	CONSTANT	*00005560
C *	N	INT	EP	EP		EARTH RATE	*00005570
C *	NB	INT	EPS	EPS	2	NO BATT	*00005580
C *	NC	INT	EPS	EPS		NO SLR CELL	*00005590
C *	NCCU	INT	EPR	EPR		NO.CCU	*00005600
C *	NCH	INT	EPS	EPS	2	NO CHGRS	*00005610
C *	NCHOSE	0	EPR,EPS	MAIN		NO. EQUIP.	*00005620
C *	NCONF(1)	I, EPS,0	MAIN	EPS,MAIN		SANDC MACRO	*00005630
C *	NCONF(5)	I, EP,0	MAIN	EP,MAIN		EP MACRO	*00005640
C *	NCONF(6)	I, EPS,0	MAIN	EPS,MAIN		VSIZE MACRO	*00005650
C *	ND	INT	EPR	EPR		NO DISCH RG	*00005660
C *	NLR	INT	EPR	EPR		NO LD REG	*00005670
C *	NPCU	INT	EPR	EPR		NO.PCU	*00005680
C *	NPD	INT	EPR	EPR		NO. PD	*00005690
C *	NSPD	INT	EPR	EPR		NO. SPD	*00005700
C *	NSR	INT	EPR	EPR		NO SHNT REG	*00005710
C *	UPTEMP	I	USER	EP	15. DEG.	C BAT TEMP.	*00005720
C *	PBOL	INT	EPR	EPR,EPS		WATTPWR B.O.L.	*00005730
C *	PD	INT	EPR	EPR		WATTBAT PWR-REG	*00005740
C *	PEXCES	INT	EPR	EPR,EPS		WATTPWD 2B DISP	*00005750
C *	PIE	INT	EPS	EPS	3.14159	CONSTANT	*00005760
C *	PL	I	ALL S/S	EPR		WATT AV PWR LD	*00005770
C *	PLMIN	I	ALL S/S	EPR		WATT MIN PWR LD	*00005780
C *	PLR	INT	EPR	EPR		WATTTOT PWR LRE	*00005790
C *	PLRD	0	EPR	THERMAL		WATTPWR DISP.LR	*00005800
C *	PS	INT	EPR	EPR,EPS		WATTEOL SOL OUT	*00005810
C *	RFD	INT	EPS	EPS		TEMP DEG FC	*00005820
C *	S	INT	EP	EP	USED IN CALC OF TE		*00005830
C *	SOL	INT	EPS	EPS	1353	W/M2AV SOL INT	*00005840
C *	TE	INT	EPS	EPR		ECPS TIME	*00005850

C *	TEDTS	INT	EPS	EPS	DARK/LITE	*00005860
C *	VB	INT	EPS	EPS	FT**3UNIT BATVOL	*00005870
C *	VBM	INT	EPR	EPS	VDCMIN BAT VLT	*00005880
C *	VBT	INT	EPS	EPS	FT**3TOT BAT VOL	*00005890
C *	YC	INT	EPS	EPS	1.1 VDCMIN CELL U	*00005900
C *	VCELL	INT	DB	HAIN	M3VOL CELL	*00005910
C *	VDB	INT	EPR	EPR	VDCAVE ALL VOL	*00005920
C *	VOL	0	MAIN		FT**3 EP VOL	*00005930
C *	WATE	INT,0	EPS	VE SIZE	KG ARRAY WT	*00005940
C *	WB	INT	EPS	EPS	KGUNIT BAT WT	*00005950
C *	WBT	INT	EPS	EPS	KGTOT BAT WT	*00005960
C *	WCELL	INT	DB	EPS	LB CELL WGT	*00005970
C *	WT	0	MAIN		LBS EP WT	*00005980
C *						*00005990
C *	*****	*****	*****	*****	*****	*00006000

ISN 0003	COMMON /USERS/	IVOLT,OPTEMP				00006010
ISN 0004	COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLMIN,					00006020
	* LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVHT,TNKWT,PASSTR,					00006030
	* SATTWT,TPRIM,IBTLOC,RADA,RADAB,RAT,HTRPWR,HTRPRB,					00006040
	* HPT,HTPIPE,VCHP,HTPT,FC,N,COMRT,ACSSN,BITRAT(2),					00006050
	* EQBLG,SABOLG,SATWT					00006051
ISN 0005	COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MMDOLD,TRUNC,ITRUNC,DE,TE,					00006053
	* TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMP,SATR,SATINV,MER,					00006054
	* MEINV,PAYR,PAYINV,PAUQU,GE,XLTOT,CTOT,FEER,FEEINV,DOTE,XVEST,					00006055
ISN 0006	* OPS,SKTAU(6),ROLD(60),TTT,AN,TS,BS,AM,TF,BF,TC,TA,TB,TOTOPS					00006056
ISN 0007	COMMON /USERI/EQM1WT,EQM2WT,DIAMAX,ALT					00006060
ISN 0008	COMMON /DBCOM/ IDB(30),DATA(55,90)					00006070
ISN 0009	DIMENSION NCONF(10), IPIC(5), ICHOSE(5), NCHOSE(5)					00006080
ISN 0010	REAL MU,N,ICH,LMBDD,LMBDG,LMBDP,K1,K2					00006090
	DATA DELF/.03/,DELI/.02/,DELM/.01/,ETAI/.105/,ETAR/1.0/,K1/1.02/,K00006100					00006100
	I2/1.4/,LMBDP/.9/,SOL/1353./,VC/1.1/,PIE/3.1415926/					00006110
ISN 0011	*,CHMINT/2.0/					00006120
	LMBDD=.3					00006130
	C **					00006140
	C ** INITIALIZATION **					00006150
ISN 0012	IF (ITER.NE.0) GO TO 140					00006160
	C MEAN RADIUS OF EARTH IN FEET					00006170
ISN 0014	HE=24.0530612E6					00006180
ISN 0015	MU=1.407645E16					00006190

ISN 0016		HP=6076.*ALT	00006200
ISN 0017		A=HP+HE	00006210
ISN 0018		A32=A**1.5	00006220
ISN 0019		HFDA=HE/A	00006230
ISN 0020		S=1.02*ARSIN(HEDA)	00006240
ISN 0021		N=SQRT(MU)/A32	00006250
ISN 0022		TEOTS=S/(PIE-S)	00006260
ISN 0023		TE=2.*S/N	00006270
ISN 0024		RFD=.01*OPTMP+1.0	00006280
ISN 0025		DO 10 I=1,5	00006290
ISN 0026	10	ICHOSE(I)=0	00006300
ISN 0027		IERR=0	00006310
	C *	LMBDD MUST GO TO REL	00006320
ISN 0028		NB=2	00006330
ISN 0029		DO 20 I=1,5	00006340
ISN 0030	20	NCHOSE(I)=0	00006350
ISN 0031		NLR=2	00006360
ISN 0032		WATE=0.0	00006370
ISN 0033		ARFA=0.0	00006380
	C		00006390
	C		00006400
	C		00006410
	C	** SET UP DELTA-R AND DELTA-T (RADIATION DEGRADATION AND	00006420
	C	TEMPERATURE CORRECTION FACTORS)	00006430
ISN 0034		DELR=.05	00006440
ISN 0035		IF (ALT.GT.400.) DELR=.3	00006450
	C		00006460
	C		00006470
	C		00006480
ISN 0037		IF (ALT.GT.5000.) GO TO 80	00006490
ISN 0039		ICONF=NCONF(5)	00006500
ISN 0040		GO TO (30,50,30,50,30,50), ICONF	00006510
ISN 0041	30	ICONF=NCONF(1)	00006520
ISN 0042		GO TO (50,50,40,40,40), ICONF	00006530
	C		00006540
ISN 0043	40	DELT=.11	00006550
ISN 0044		GO TO 140	00006560
	C		00006570
	C		00006580

ISN 0045	50	ICONF=NCONF(1)	00006590
ISN 0046		GO TO (60,60,70,70,70), ICONF	00006600
	C		00006610
ISN 0047	60	DELT=.01	00006620
ISN 0048		GO TO 140	00006630
	C		00006640
ISN 0049	70	DELT=.04	00006650
ISN 0050		GO TO 140	00006660
	C		00006670
	C	** ALTITUDE IS GREATER THAN 5000 NAUTICAL MILES **	00006680
	C		00006690
ISN 0051	80	ICONF=NCONF(5)	00006700
ISN 0052		GO TO (90,110,90,110,90,110), ICONF	00006710
	C		00006720
ISN 0053	90	ICONF=NCONF(1)	00006730
ISN 0054		GO TO (140,140,100,100,100), ICONF	00006740
	C		00006750
ISN 0055	100	DELT=.08	00006760
ISN 0056		GO TO 140	00006770
	C		00006780
ISN 0057	110	ICONF=NCONF(1)	00006790
ISN 0058		GO TO (120,120,130,130,130), ICONF	00006800
	C		00006810
ISN 0059	120	DELT=-.05	00006820
ISN 0060		GO TO 140	00006830
	C		00006840
ISN 0061	130	DELT=.02	00006850
	C		00006860
	C		00006870
	C	*****	00006880
	C	* NOW WE WILL BE DOING THE LPR MACRO SELECTION (S,SANDB,SLR)	00006890
	C	*****	00006900
	C		00006910
ISN 0062	140	ICONF=NCONF(5)	00006920
ISN 0063		GO TO (150,150,280,280,450,450), ICONF	00006930
	C		00006940
	C		00006950
	C	** SHUNT REGULATION DESIGN **	00006960
	C		00006970

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ISN 0064	150	ICONF=NCONF(5)	00006980
ISN 0065		ISR1E=IDB(1)	00006990
ISN 0066		ICELLE=IDB(2)	00007000
ISN 0067		ICHGRE=IDB(3)	00007010
ISN 0068		IPCUE=IDB(12)	00007020
	C		00007030
ISN 0069		IF (IPIC(1).NE.0) GO TO 160	00007040
ISN 0071		ISR1=1	00007050
ISN 0072		ICELL=IDB(1)+1	00007060
ISN 0073		ICHGR=IDB(2)+1	00007070
ISN 0074		PCU=IDB(11)+1	00007080
ISN 0075		NPCU=1	00007090
ISN 0076		ETAE=0.65	00007100
ISN 0077		ETAC=1.0	00007110
ISN 0078		ETAD=1.0	00007120
ISN 0079		ETAR=1.0	00007130
ISN 0080		GO TO 210	00007140
	C		00007150
ISN 0081	160	IF (ITER.EQ.0) GO TO 170	00007160
ISN 0083		ISR1=IPIC(1)	00007170
ISN 0084		ICELL=IPIC(2)	00007180
ISN 0085		ICHGR=IPIC(3)	00007190
ISN 0086		GO TO 210	00007200
	C		00007210
ISN 0087	170	IF (ISR1.GE.ISR1E) GO TO 180	00007220
ISN 0089		ISR1=IPIC(1)+1	00007230
ISN 0090		ICELL=IPIC(2)	00007240
ISN 0091		ICHGR=IPIC(3)	00007250
ISN 0092		GO TO 210	00007260
	C		00007270
ISN 0093	180	IF (ICELL.GE.ICELLE) GO TO 190	00007280
ISN 0095		ISR1=1	00007290
ISN 0096		ICELL=IPIC(2)+1	00007300
ISN 0097		ICHGR=IPIC(3)	00007310
ISN 0098		GO TO 210	00007320
	C		00007330
ISN 0099	190	IF (ICHGR.GE.ICHGRE) GO TO 200	00007340
ISN 0101		ISR1=1	00007350
ISN 0102		ICELL=IDB(1)+1	00007360



ISN 0103		ICHGR=IPIC(3)+1	00007370
ISN 0104		GO TO 210	00007380
	C		00007390
ISN 0105	200	ICHOSE(1)=-1	00007400
ISN 0106		ICHOSE(2)=-1	00007410
ISN 0107		ICHOSE(3)=-1	00007420
ISN 0108		RETURN	00007430
	C		00007440
	C		00007450
	C **	COMPUTE SELECTION PARAMETERS FOR SHUNT REGULATION DESIGN - -	00007460
	C **	THIS IS FOR SHUNT REGULATOR, BATTERY AND BATTERY CHARGER - -	00007470
	C		00007480
	C		00007490
	C		00007500
	C **	DETERMINE NUMBER OF SHUNT REGULATORS REQUIRED	00007510
	C		00007520
ISN 0109	210	NSR=1	00007530
ISN 0110	220	CAPMAX=DATAB(6,ISR1)	00007540
	C	** DETERMINE EXCESS ARRAY POWER FOR REGULATION	00007550
	C		00007560
ISN 0111		PS=(PL/ETAR)*(1.+TEUTS*(1./(ETAD*ETAC*ETAE)))	00007570
	C		00007580
ISN 0112		PBOL=PS/((1.-DELR)*(1.-DELF)*(1.-DELT)*(1-DELI)*(1-DELM))	00007590
	C		00007600
ISN 0113		PEXCES=PBOL-PLMIN	00007610
	C		00007620
ISN 0114		IF (PLMIN.GE.PEXCES) GO TO 230	00007630
ISN 0116		NSR=(PEXCES-PLMIN)/CAPMAX+.9	00007640
ISN 0117		IF (NSR.LE.0) NSR=1	00007650
ISN 0119	230	CONTINUE	00007660
	C		00007670
	C **	NOTE - - ADD SPECIAL EQUIPMENT (AS NECESSARY)	00007680
	C		00007690
	C		00007700
	C **	SET VOLTAGES FOR THIS DESIGN	00007710
	C		00007720
ISN 0120		VDB=27.	00007730
ISN 0121		VEM=25.	00007740
	C		00007750

	C	** BATTERY ALGORITHM	00007760
	C		00007770
	C	DETERMINE REQUIRED CAPACITIES	00007780
	C		00007790
ISN 0122		CR=(PL*TE/3600.)/(LMBDD*ETAD)	00007800
ISN 0123		CA=CR/VDB	00007810
	C		00007820
	C	DETERMINE MINIMUM INSTALLED CAPACITY	00007830
	C		00007840
ISN 0124		CI=CA*RFD	00007850
	C		00007860
	C	** DETERMINE NUMBER OF CELLS IN SERIES (TO BE SUPPLIED TO REL)	00007870
	C		00007880
ISN 0125		NC=VBM/VC	00007890
	C		00007900
	C	DETERMINE SELECTION PARAMETERS ON CELLS	00007910
ISN 0126		IF (ITER .GE. 1) NB=NCHOSE(2)	00007920
ISN 0128		CISTAR=CI/NB	00007930
	C		00007940
	C		00007950
	C	* DETERMINE CHARGE CURRENT RATING REQUIRED FOR THE BATTERY CHARGER	*00007960
ISN 0129		CCELL=CISTAR	00007970
ISN 0130		ICH=CCELL/CHMINT	00007980
	C		00007990
	C		00008000
	C	** COMPARE THE HARDWARE PARAMETER TO THE SELECTION PARAMETER	**00008020
	C	**	00008030
ISN 0131		IF (DATAB(6,ISRI).GE.CAPMAX.AND.DATAB(6,ICELL).GE.CISTAR.AND.DATAB(6,ICHGR).GE.ICH) GO TO 270	00008040
	C		00008050
ISN 0133		IF (ISRI.GE.ISRIE) GO TO 240	00008060
ISN 0135		ISRI=ISRI+1	00008070
ISN 0136		GO TO 220	00008080
	C		00008090
ISN 0137	240	IF (ICELL.GE.ICELLE) GO TO 250	00008100
ISN 0139		ISRI=1	00008110
ISN 0140		ICELL=ICELL+1	00008120
ISN 0141		GO TO 220	00008130
			00008140

	C			00008150
ISN 0142	250	IF (ICHGR.GE.ICHGRC) GO TO 260		00008160
ISN 0144		ISRI=1		00008170
ISN 0145		ICELL=IDB(1)+1		00008180
ISN 0146		ICHGR=ICHGR+1		00008190
ISN 0147		GO TO 220		00008200
	C			00008210
ISN 0148	260	ICHOSE(1)=-1		00008220
ISN 0149		ICHOSE(2)=-1		00008230
ISN 0150		ICHOSE(3)=-1		00008240
ISN 0151		RETURN		00008250
	C			00008260
	C			00008270
ISN 0152	270	VCELL=DATAB(24,ICELL)		00008280
ISN 0153		WCELL=DATAB(23,ICELL)		00008290
ISN 0154		ETA=DATAB(7,ICELL)		00008300
	C			00008310
ISN 0155		WB=NC*WCELL*K2		00008320
ISN 0156		VB=NC*VCELL*K1		00008330
	C			00008340
ISN 0157		WBT=WB*NB		00008350
ISN 0158		VBT=VB*NB		00008360
	C			00008370
ISN 0159		ETAC=DATAB(7,ICHGR)		00008380
ISN 0160		NCH=NB		00008390
	C			00008400
	C			00008410
ISN 0161		IF (NCHOSE(1) .GE. NSR) GO TO 271		00008420
ISN 0163		NCHOSE(1)=NSR		00008430
ISN 0164	271	IF (NCHOSE(2) .GE. NB) GO TO 272		00008440
ISN 0166		NCHOSE(2)=NB		00008450
ISN 0167	272	IF (NCHOSE(3) .GE. NCH) GO TO 273		00008460
ISN 0169		NCHOSE(3)=NCH		00008470
ISN 0170	273	IF (NCHOSE(4) .GE. NPCU) GO TO 274		00008480
ISN 0172		NCHOSE(4)=NPCU		00008490
ISN 0173	274	NCHOSE(5)=0		00008500
	C			00008510
ISN 0174		ICHOSE(1)=DATAB(1,ISRI)		00008520
ISN 0175		ICHOSE(2)=DATAB(1,ICELL)		00008530

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ISN 0176		ICHOSE(3)=DATAB(1,ICHGR)	00008540
ISN 0177		ICHOSE(4)=DATAB(1,PCU)	00008550
ISN 0178		ICHOSE(5)=0	00008560
	C		00008570
ISN 0179		IPIC(1)=ISR1	00008580
ISN 0180		IPIC(2)=ICELL	00008590
ISN 0181		IPIC(3)=ICHGR	00008600
ISN 0182		IPIC(4)=PCU	00008610
ISN 0183		IPIC(5)=0	00008620
	C		00008630
	C		00008640
ISN 0184		WT=NSR*DATAB(23,ISR1)+WBT+NCH*DATAB(23,ICHGR)+NPCU*DATAB(23,PCU)	00008650
		* +WT	00008660
	C		00008670
ISN 0185		VOL=NSR*DATAB(24,ISR1)+VBT+NCH*DATAB(24,ICHGR)+NPCU*DATAB(24,PCU)	00008680
		* +VOL	00008690
	C		00008700
ISN 0186		GO TO 590	00008710
	C		00008720
	C		00008730
	C	** SHUNT AND DISCHARGE DESIGN **	00008740
	C		00008750
ISN 0187	280	ICONF=NCUNF(5)	00008760
ISN 0188		IDRE=IDB(4)	00008770
ISN 0189		ISR2F=IDB(5)	00008780
ISN 0190		ICELLE=IDB(2)	00008790
ISN 0191		ICHGRE=IDB(6)	00008800
ISN 0192		NCCU=1	00008810
	C		00008820
ISN 0193		IF (IPIC(1).NE. 0) GO TO 290	00008830
ISN 0195		IDR=IDB(3)+1	00008840
ISN 0196		ISR2=IDB(4)+1	00008850
ISN 0197		ICELL=IDB(1)+1	00008860
ISN 0198		ICHGR=IDB(5)+1	00008870
ISN 0199		ICCU=IDB(6)+1	00008880
ISN 0200		ETAD=0.85	00008890
ISN 0201		ETAC=1.0	00008900
ISN 0202		ETAE=0.65	00008910
ISN 0203		ETAR=1.0	00008920

ISN 0204		GO TO 360	00008930
	C		
ISN 0205	290	IF (ITER.EQ.0) GO TO 300	00008940
ISN 0207		IDR=IPIC(1)	00008950
ISN 0208		ISR2=IPIC(2)	00008960
ISN 0209		ICELL=IPIC(3)	00008970
ISN 0210		ICHGR=IPIC(4)	00008980
ISN 0211		ICCU=IPIC(5)	00008990
ISN 0212		GO TO 360	00009000
	C		
ISN 0213	300	IF (IDR.GE.IDRE) GO TO 310	00009010
ISN 0215		IDR=IPIC(1)+1	00009020
ISN 0216		ISR2=IPIC(2)	00009030
ISN 0217		ICELL=IPIC(3)	00009040
ISN 0218		ICHGR=IPIC(4)	00009050
ISN 0219		ICCU=IPIC(5)	00009060
ISN 0220		GO TO 360	00009070
	C		
ISN 0221	310	IF (ISR2.GE.ISR2E) GO TO 320	00009080
ISN 0223		IDR=IDB(3)+1	00009090
ISN 0224		ISR2=IPIC(2)+1	00009100
ISN 0225		ICELL=IPIC(3)	00009110
ISN 0226		ICHGR=IPIC(4)	00009120
ISN 0227		ICCU=IPIC(5)	00009130
ISN 0228		GO TO 360	00009140
	C		
ISN 0229	320	IF (ICELL.GE.ICELLE) GO TO 330	00009150
ISN 0231		IDR=IDB(3)+1	00009160
ISN 0232		ISR2=IDB(4)+1	00009170
ISN 0233		ICELL=IPIC(3)+1	00009180
ISN 0234		ICHGR=IPIC(4)	00009190
ISN 0235		ICCU=IPIC(5)	00009200
ISN 0236		GO TO 360	00009210
	C		
ISN 0237	330	IF (ICHGR.GE.ICHGRE) GO TO 340	00009220
ISN 0239		IDR=IDB(3)+1	00009230
ISN 0240		ISR2=IDB(4)+1	00009240
ISN 0241		ICELL=IDB(1)+1	00009250
ISN 0242		ICHGR=IPIC(4)+1	00009260
			00009270
			00009280
			00009290
			00009300
			00009310

ISN 0243		ICCU=IPIC(5)	00009320
ISN 0244		GO TO 360	00009330
	C		00009340
ISN 0245	340	OO 350 I=1,5	00009350
ISN 0246	350	ICHOSE(I)=-1	00009360
ISN 0247		RETURN	00009370
	C		00009380
	C		00009390
	C **	COMPUTE SELECTION PARAMETERS FOR SHUNT AND DISCHARGE REGULATION -	00009400
	C **	THIS IS FOR DISCHARGE REGULATOR, SHUNT REGULATOR, BATTERY, BATTERY	00009410
	C **	CHARGER AND SIZING THE CENTRAL CONTROL UNIT - -	00009420
	C		00009430
	C **	DETERMINE NUMBER OF DISCHARGE REGULATORS REQUIRED	00009440
	C		00009450
ISN 0248	360	ND=N6	00009460
	C		00009470
	C	** DETERMINE EXCESS ARRAY POWER FOR REGULATION	00009480
	C		00009490
ISN 0249		PS=(PL/ETAR)*((1.+TEDTS*(1./(ETAD*ETAC*ETAE)))	00009500
ISN 0250		PBOL=PS/((1.-DELR)*(1.-DELF)*(1.-DELT)*(1-DELI)*(1-DELM))	00009510
	C		00009520
ISN 0251		PEXCES=PBOL-PLMIN	00009530
	C		00009540
ISN 0252		IF (ITER .GE. 1 .AND. NCHOSE(1) .GE. ND) ND=NCHOSE(1)	00009550
ISN 0254		PD=PL/(ND*ETAD)	00009560
	C		00009570
	C **	DETERMINE NUMBER OF SHUNT REGULATORS REQUIRED	00009580
	C		00009590
ISN 0255	370	CAPMAX=DATAB(6,ISR2)	00009600
ISN 0256		NSR=1	00009610
ISN 0257		IF (PLMIN.GE.PEXCES) GO TO 380	00009620
ISN 0259		NSR=(PEXCES-PLMIN)/CAPMAX+.9	00009630
ISN 0260		IF (NSR.LE.0) NSR=1	00009640
ISN 0262	380	CONTINUE	00009650
	C		00009660
	C **	SET VOLTAGES FOR SHUNT AND DISCHARGE DESIGN	00009670
	C		00009680
ISN 0263		VDB=21.	00009690
ISN 0264		VBM=19.	00009700

	C			00009710
	C	**	SET UP BATTERY SELECTION PARAMETER	00009720
	C			00009730
	C		DETERMINE REQUIRED CAPACITIES	00009740
	C			00009750
ISN 0265			$CR = (PL * TE / 3600.) / (LMBDD * ETAD)$	00009760
ISN 0266			$CA = CR / VDB$	00009770
	C			00009780
	C		DETERMINE MINIMUM INSTALLED CAPACITY	00009790
	C			00009800
ISN 0267			$CI = CA * RFD$	00009810
	C			00009820
	C		DETERMINE NUMBER OF CELLS IN SERIES (TO BE SUPPLIED TO REL)	00009830
	C			00009840
ISN 0268			$NC = VBM / VC$	00009850
	C			00009860
	C		CISTAR IS SELECTION PARAMETER ON CELLS	00009870
	C			00009880
9-120 ISN 0269			IF (ITER .GE. 1) NB=NCHDSE(3)	00009890
ISN 0271			CISTAR=CI/NB	00009900
	C			00009910
	C	**	CHARGER SELECTION	00009920
	C			00009930
	C	*	DETERMINE CHARGE CURRENT RATING REQUIRED FOR THE BATTERY CHARGER	*00009940
	C			00009950
ISN 0272			$CCELL = CISTAR$	00009960
ISN 0273			$ICH = CCELL / CHMINT$	00009970
	C			00009980
	C	**		00009990
	C	**		00010000
	C	**	COMPARE THE HARDWARE PARAMETER TO THE SELECTION PARAMETER	**00010010
	C	**		00010020
	C	**		00010030
	C			00010040
ISN 0274			IF (DATAB(6, IDR).GE.PD.AND.DATAB(6,ISR2).GE.CAPMAX.AND.DATAB(6,ICE	00010050
			ILL).GE.CISTAR.AND.DATAB(6,ICHGR).GE.ICH) GO TO 440	00010060
	C			00010070
ISN 0276			IF (IDR.GE.IDRE) GO TO 390	00010080
ISN 0278			IDR=IDR+1	00010090

ISN 0279		GO TO 370	00010100
	C		00010110
ISN 0280	390	IF (ISR2.GE.ISR2E) GO TO 400	00010120
ISN 0282		IDR=IDB(3)+1	00010130
ISN 0283		ISR2=ISR2+1	00010140
ISN 0284		GO TO 370	00010150
	C		00010160
ISN 0285	400	IF (ICELL.GE.ICELLE) GO TO 410	00010170
ISN 0287		IDR=IDB(3)+1	00010180
ISN 0288		ISR2=IDB(4)+1	00010190
ISN 0289		ICELL=ICELL+1	00010200
ISN 0290		GO TO 370	00010210
	C		00010220
ISN 0291	410	IF (ICHGR.GE.ICHGRE) GO TO 420	00010230
ISN 0293		IDR=IDB(3)+1	00010240
ISN 0294		ISR2=IDB(4)+1	00010250
ISN 0295		ICELL=IDB(1)+1	00010260
ISN 0296		ICHGR=ICHGR+1	00010270
ISN 0297		GO TO 370	00010280
	C		00010290
ISN 0298	420	DO 430 I=1,5	00010300
ISN 0299	430	ICHOSE(I)=-1	00010310
ISN 0300		RETURN	00010320
	C		00010330
	C		00010340
ISN 0301	440	ETAD=DATAB(7, IDR)	00010350
ISN 0302		ETAE=DATAB(7, ICELL)	00010360
ISN 0303		ETAC=DATAB(7, ICHGR)	00010370
ISN 0304		VCELL=DATAB(24, ICELL)	00010380
ISN 0305		WCELL=DATAB(23, ICELL)	00010390
ISN 0306		WB=NC*WCELL*K2	00010400
ISN 0307		VB=NC*VCELL*K1	00010410
ISN 0308		WET=WB*NB	00010420
ISN 0309		VBET=VB*NB	00010430
ISN 0310		NCH=Nb	00010440
	C		00010450
ISN 0311		ICHOSE(1)=DATAB(1, IDR)	00010460
ISN 0312		ICHOSE(2)=DATAB(1, ISR2)	00010470
ISN 0313		ICHOSE(3)=DATAB(1, ICELL)	00010480



ISN 0314		ICHOSE(4)=DATAB(1,ICHGR)	00010490
ISN 0315		ICHOSE(5)=DATAB(1,ICCU)	00010500
	C		00010510
ISN 0316		IF (NCHOSE(1) .GE. ND) GO TO 451	00010520
ISN 0318		NCHOSE(1)=ND	00010530
ISN 0319	451	IF (NCHOSE(2) .GE. NSR) GO TO 452	00010540
ISN 0321		NCHOSE(2)=NSR	00010550
ISN 0322	452	IF (NCHOSE(3) .GE. NB) GO TO 453	00010560
ISN 0324		NCHOSE(3)=NB	00010570
ISN 0325	453	IF (NCHOSE(4) .GE. NCH) GO TO 454	00010580
ISN 0327		NCHOSE(4)=NCH	00010590
ISN 0328	454	IF (NCHOSE(5) .GE. NCCU) GO TO 455	00010600
ISN 0330		NCHOSE(5)=NCCU	00010610
	C **		00010620
ISN 0331	455	IPIC(1)=IDR	00010630
ISN 0332		IPIC(2)=ISR2	00010640
ISN 0333		IPIC(3)=ICELL	00010650
ISN 0334		IPIC(4)=ICHGR	00010660
9-122 ISN 0335		IPIC(5)=ICCU	00010670
	C		00010680
	C		00010690
ISN 0336		WT=ND*DATAB(23, IDR)+NSR*DATAB(23, ISR2)+WBT+NCH*DATAB(23, ICHGR)+ * NCCU*DATAB(23, ICCU)+WT	00010700
	C		00010710
ISN 0337		VOL=ND*DATAB(24, IDR)+NSR*DATAB(24, ISR2)+VBT+NSR*DATAB(24, ICHGR)+ * NCCU*DATAB(24, ICCU)+VOL	00010720
	C		00010730
ISN 0338		GO TO 590	00010740
	C		00010750
	C		00010760
	C	** SERIES LOAD REGULATION DESIGN	00010770
	C		00010780
ISN 0339	450	ICONF=NCONF(5)	00010800
ISN 0340		ILRE=IDB(8)	00010810
ISN 0341		ICELLE=IDB(2)	00010820
ISN 0342		ICHGRE=IDB(9)	00010830
ISN 0343		ISPDE=IDB(10)	00010840
ISN 0344		IPDE=IDB(11)	00010850
	C		00010860
			00010870

ISN 0345		IF (IPIC(1).NE.0) GO TO 460	00010880
ISN 0347		ILR=IDB(7)+1	00010890
ISN 0348		ICELL=IDB(1)+1	00010900
ISN 0349		ICHGR=IDB(8)+1	00010910
ISN 0350		ISPD=IDB(9)+1	00010920
ISN 0351		IPD=IDB(10)+1	00010930
ISN 0352		ETALR=0.9	00010940
ISN 0353		ETAE=0.65	00010950
ISN 0354		ETAC=1.0	00010960
ISN 0355		FTAD=1.0	00010970
ISN 0356		NSPD=1	00010980
ISN 0357		NPD=1	00010990
ISN 0358		GO TO 520	00011000
	C		
ISN 0359	460	IF (ITER.EQ.0) GO TO 470	00011010
ISN 0361		ILR=IPIC(1)	00011020
ISN 0362		ICELL=IPIC(2)	00011030
ISN 0363		ICHGR=IPIC(3)	00011040
ISN 0364		ISPD=IPIC(4)	00011050
ISN 0365		IPD=IPIC(5)	00011060
ISN 0366		GO TO 520	00011070
	C		
ISN 0367	470	IF (ILR.GE.ILRE) GO TO 480	00011080
ISN 0369		ILR=IPIC(1)+1	00011090
ISN 0370		ICELL=IPIC(2)	00011100
ISN 0371		ICHGR=IPIC(3)	00011110
ISN 0372		ISPD=IPIC(4)	00011120
ISN 0373		IPD=IPIC(5)	00011130
ISN 0374		GO TO 520	00011140
	C		
ISN 0375	480	IF (ICELL.GE.ICELLE) GO TO 490	00011150
ISN 0377		ILR=IDB(7)+1	00011160
ISN 0378		ICELL=IPIC(2)+1	00011170
ISN 0379		ICHGR=IPIC(3)	00011180
ISN 0380		ISPD=IPIC(4)	00011190
ISN 0381		IPD=IPIC(5)	00011200
	C		
ISN 0382	490	IF (ICHGR.GE.ICHGRE) GO TO 500	00011210
ISN 0384		ILR=IDB(7)+1	00011220
			00011230
			00011240
			00011250
			00011260

ISN 0385		ICELL=IDB(1)+1	00011270
ISN 0386		ICHGR=IPIC(3)+1	00011280
ISN 0387		ISPD=IPIC(4)	00011290
ISN 0388		IPD=IPIC(5)	00011300
	C		00011310
ISN 0389	500	DO 510 I=1,5	00011320
ISN 0390	510	ICHOSF(I)=-1	00011330
ISN 0391		RETURN	00011340
	C		00011350
	C		00011360
	C **	COMPUTE SELECTION PARAMETERS FOR SERIES LOAD REGULATION	00011370
	C **	THIS IS FOR THE LOAD REGULATOR, BATTERY, BATTERY CHARGER AND	00011380
	C **	SIZING THE SOLAR POWER DISTRIBUTOR AND POWER DISTRIBUTOR	00011390
	C		00011400
	C		00011410
	C	NLR IS THE NUMBER OF LOAD REGULATORS REQUIRED	00011420
ISN 0392	520	NLR=2	00011430
	C		00011440
	C	** DETERMINE EXCESS ARRAY POWER FOR REGULATION	00011450
	C		00011460
ISN 0393		$PS=(PL/ETAR)*(1.+TEDTS*(1./((ETAD*ETAC*ETAE)))$	00011470
ISN 0394		$PBOL=PS/((1.-DELR)*(1.-DELF)*(1.-DELT)*(1.-DELI)*(1.-DELM))$	00011480
ISN 0395		PEXCES=PBOL-PLMIN	00011490
	C		00011500
	C		00011510
	C	DETERMINE SELECTION PARAMETERS FOR LOAD REGULATORS	00011520
	C		00011530
ISN 0396		IF (ITER .GE. 1 .AND. NCHOSE(1) .GE. NLR) NLR=NCHOSE(1)	00011540
ISN 0398		PLR=PL/(ETALR*NLR)	00011550
	C		00011560
	C	SET VOLTAGES FOR THIS DESIGN	00011570
	C		00011580
	C		00011590
ISN 0399		VDB=27.	00011600
ISN 0400		VBM=23.	00011610
	C		00011620
	C **	SET UP BATTERY SELECTION PARAMETERS	00011630
	C		00011640
	C	DETERMINE REQUIRED CAPACITIES	00011650

ISN 0401	C	CR=(PL*TE/3600.)/(LMBDD*ETAD)	00011660
ISN 0402		CA=CR/VDB	00011670
	C		00011680
	C	DETERMINE MINIMUM INSTALLED CAPACITY	00011690
	C		00011700
ISN 0403	C	CI=CA*RFD	00011710
	C		00011720
	C	DETERMINE NUMBER OF CELLS IN SERIES (TO BE SUPPLIED TO REL)	00011730
	C		00011740
ISN 0404	C	NC=VBM/VC	00011750
	C		00011760
	C	CISTAR IS SELECTION PARAMETERS ON CELLS	00011770
	C		00011780
ISN 0405	C	IF (ITER .GE. 1) NB=NCHOSE(2)	00011790
ISN 0407	C	CISTAR=CI/NB	00011800
	C		00011810
	C **	CHARGER SELECTION PARAMETER	00011820
	C		00011830
	C *	DETERMINE CHARGE CURRENT RATING REQUIRED FOR THE BATTERY CHARGER	00011840
	C		*00011850
9-125 ISN 0408	C	CCELL=CISTAR	00011860
ISN 0409	C	ICH=CCELL/CHMINT	00011870
	C		00011880
	C **		00011890
	C **		00011900
	C **	COMPARE THE HARDWARE PARAMETER TO THE SELECTION PARAMETER	00011910
	C **		**00011920
	C **		00011930
	C **		00011940
	C		00011950
ISN 0410	530	IF (DATAB(6,ILR).GE.PLR.AND.DATAB(6,ICELL).GE.CISTAR.AND.DATAB(6,ICHR).GE.ICH) GO TO 580	00011960
	C		00011970
	C		00011980
ISN 0412		IF (ILR.GE.ILRE) GO TO 540	00011990
ISN 0414		ILR=ILR+1	00012000
ISN 0415		GO TO 530	00012010
	C		00012020
ISN 0416	540	IF (ICELL.GE.ICELLE) GO TO 550	00012030
			00012040

ISN 0418		ILR=IDB(7)+1	00012050
ISN 0419		ICELL=ICELL+1	00012060
ISN 0420		GO TO 530	00012070
	C		
ISN 0421	550	IF (ICHGR.GE.ICHGRE) GO TO 560	00012080
ISN 0423		ILR=IDB(7)+1	00012090
ISN 0424		ICELL=IDB(1)+1	00012100
ISN 0425		ICHGR=ICHGR+1	00012120
ISN 0426		GO TO 530	00012130
	C		
ISN 0427	560	DO 570 I=1,5	00012140
ISN 0428	570	ICHOSE(I)=-1	00012150
ISN 0429		RETURN	00012160
	C		00012170
	C		00012180
	C		00012190
ISN 0430	580	ETALR=DATAB(7,ILR)	00012200
ISN 0431		ETAR=ETALR	00012210
ISN 0432		PLRD=PL*(1./ETALR-1.)	00012220
ISN 0433		ETAE=DATAB(7,ICELL)	00012230
ISN 0434		ETAC=DATAB(7,ICHGR)	00012240
ISN 0435		VCELL=DATAB(24,ICELL)	00012250
ISN 0436		WCELL=DATAB(23,ICELL)	00012260
ISN 0437		WB=NC*WCELL*K2	00012270
ISN 0438		VB=NC*VCELL*K1	00012280
ISN 0439		WBT=WB*NB	00012290
ISN 0440		VBT=VB*NB	00012300
ISN 0441		NCH=NB	00012310
	C		
ISN 0442		ICHOSE(1)=DATAB(1,ILR)	00012320
ISN 0443		ICHOSE(2)=DATAB(1,ICELL)	00012330
ISN 0444		ICHOSE(3)=DATAB(1,ICHGR)	00012340
ISN 0445		ICHOSE(4)=DATAB(1,ISPD)	00012350
ISN 0446		ICHOSE(5)=DATAB(1,IPD)	00012360
	C		00012370
ISN 0447		IF (NCHOSE(1) .GE. NLR) GO TO 581	00012380
ISN 0449		NCHOSE(1)=NLR	00012390
ISN 0450	581	IF (NCHOSE(2) .GE. NB) GO TO 582	00012400
ISN 0452		NCHOSE(2)=NB	00012410
ISN 0453	582	IF (NCHOSE(3) .GE. NCH) GO TO 583	00012420
			00012430

ISN 0455		NCHOSE(3)=NCH	00012440
ISN 0456	583	IF (NCHOSE(4) .GE. NSPD) GO TO 584	00012450
ISN 0458		NCHOSE(4)=NSPD	00012460
ISN 0459	584	IF (NCHOSE(5) .GE. NPD) GO TO 585	00012470
ISN 0461		NCHOSE(5)=NPD	00012480
	C		00012490
ISN 0462	585	IPIC(1)=ILR	00012500
ISN 0463		IPIC(2)=ICELL	00012510
ISN 0464		IPIG(3)=ICHGR	00012520
ISN 0465		IPIC(4)=ISPD	00012530
ISN 0466		IPIC(5)=IPD	00012540
	C		00012550
	C		00012560
	C		00012570
ISN 0467		WT=NLR*DATAB(23,ILR)+WBT*NCH*DATAB(23,ICHGR)+NSPD*DATAB(23,ISPD)+ * NPD*DATAB(23,IPD)+WT	00012580
	C		00012590
ISN 0468		VOL=NLR*DATAB(24,ILR)+VBT+NCH*DATAB(24,ICHGR)+NSPD*DATAB(24,ISPD)+ * +NPD*DATAB(24,IPD)+VOL	00012600
	C		00012610
	C		00012620
	C		00012630
	C	** SOLAR ARRAY SIZING	00012640
	C		00012650
	C		00012660
	C		00012670
ISN 0469	590	ICONF=NCONF(5)	00012680
ISN 0470		GO TO (600,610,600,610,600,610), ICONF	00012690
	C		00012700
	C	** ORIENTED PADDLE SOLAR ARRAY (NON-SPINNING)	00012710
	C		00012720
ISN 0471	600	FW=7.3	00012730
ISN 0472		LMBDG=1:	00012740
ISN 0473		GO TO 670	00012750
	C		00012760
	C		00012770
	C		00012780
ISN 0474	610	ICONF=NCONF(6)	00012790
ISN 0475		GO TO (630,620,650), ICONF	00012800
	C		00012810
	C	** BODY MOUNTED, BOX SHAPE, NON-SPINNING	00012820

	C			00012830
ISN 0476	620	FW=3.4		00012840
ISN 0477		LMBDG=1.		00012850
ISN 0478		GO TO 670		00012860
	C			00012870
	C			00012880
ISN 0479	630	ICONF=NCONF(1)		00012890
ISN 0480		IF (ICONF .GE. 3) GO TO 640		00012900
	C			00012910
	C	** BODY MOUNTED CYLINDER SPINNING		00012920
	C			00012930
ISN 0482		FW=3.4		00012940
ISN 0483		LMBDG=1./PIE		00012950
ISN 0484		GO TO 670		00012960
	C			00012970
	C	** BODY MOUNTED CYLINDER NON-SPINNING		00012980
	C			00012990
9-128	640	FW=3.4		00013000
ISN 0485		LMBDG=2./PIE		00013010
ISN 0486		GO TO 670		00013020
ISN 0487				00013030
	C			00013040
	C			00013050
ISN 0488	650	ICONF=NCONF(1)		00013060
ISN 0489		IF (ICONF .GE. 3) GO TO 660		00013070
	C			00013080
	C	** BODY MOUNTED SPHERE SPINNING		00013090
	C			00013100
ISN 0491		FW=3.4		00013110
ISN 0492		LMBDG=.25		00013120
ISN 0493		GO TO 670		00013130
	C			00013140
	C	** BODY MOUNTED SPHERE NON-SPINNING		00013150
	C			00013160
ISN 0494	660	FW=3.4		00013170
ISN 0495		LMBDG=.5		00013180
	C			00013190
	C	COMPUTE ENERGY BALANCE EQUATION		00013200
				00013210

ISN 0496	C 670 E	PS=PL/ETAR*(1.+TEDTS*(1./(ETAD*ETAC*ETAE)))	00013220 00013230 00013240
ISN 0497	C C	COMPUTE SIZING FACTOR FS=LMBDG*LMBDP*((1.-DELR)*(1.-DELF)*(1.-DELT)*(1.-DELI)*(1.-DELM))	00013250 00013260 00013270
ISN 0498	C C C	COMPUTE ARRAY AREA A1=PS/(FS*SOL*ETA1)	00013280 00013290 00013300
ISN 0499	C C C	COMPUTE ARRAY WEIGHT WATE=A1*FW	00013310 00013320 00013330
ISN 0500	C	CONVERT TO ENGLISH FROM METRIC AREA=A1*10.76426265	00013340 00013350 00013360
ISN 0501	C	WATE=WATE*2.20462	00013370 00013380 00013390
ISN 0502	C	RETURN	00013400 00013410 00013420
ISN 0503	C	END	00013430 00013440

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,IO,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 502 ,PROGRAM SIZE = 8368

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\* 57K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF			
ISN 0002		SUBROUTINE AUXPRO(IPIC,IERR,ITER,NCONF,ICHOSE,NCHOSE)	00014750
ISN 0003		COMMON /USER2/TTHST,CLIFE	00014760
ISN 0004		COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,ACTHST,TOTIMP,PL, *PLMIN,LMBDD,AREA,SATLG,WATE,NC,ACSHP,HARNWT,THGMWT,CONVMT,TKWNT, * PASSTF,SATWT,TPRIM,IBTLOC,RADA,RADAB,KAT,HTRPWR, * HTRPRB,HPT,HTPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2), * EQBLG,SABOLG,SATWT	00014770 00014780 00014790 00014800 00014801
ISN 0005		COMMON /USER1/EQM1WT,EQM2WT,DIAMAX,ALT	00014810
ISN 0006		COMMON /DBCQ/IDB(30),DATAB(55,90)	00014820
ISN 0007		DIMENSION IPIC(9),NCONF(6),ICHOSE(14),NCHOSE(14), * IACPT(20)	00014830 00014840
ISN 0008		DIMENSION N(14)	00014850
ISN 0009		DATA XMR/1.5/	00014860
ISN 0010		IF(NCONF(2).GT.1) GO TO 38	00014870
	C		00014880
	C	THIS IS COLD GAS CONFIGURATION	00014890
9-130	C		00014900
	C	DETERMINE MAXIMUM THRUST FROM SANDC	00014910
	C		00014920
ISN 0012		FMAX= AMAX1(ACTHST,TTHST)	00014930
ISN 0013		IF(FMAX.LT.50..AND.TOTIMP.LT.50000.) GO TO 1	00014940
	C		00014950
	C	THIS IS NOT AN ACCEPTABLE CONFIGURATION	00014960
	C		00014970
ISN 0015		ICHOSE(1)=-1	00014980
ISN 0016		RETURN	00014990
	C		00015000
ISN 0017		1 CONTINUE	00015010
	C		00015020
ISN 0018		IF(ITER.NE.0) GO TO 3	00015030
	C		00015040
	C	INITIALIZE ICHOSE, NCHOSE, IERR AND SELECT HARDWARE NOT SIZED I.E., THE FILL AND VENT VALVE AND RELIEF VALVE	00015050
	C		00015060
ISN 0020		DO 2 I=1,14	00015070
ISN 0021		ICHOSE(I)= 0	00015080
ISN 0022		2 NCHOSE(I)= 0	00015090
ISN 0023		IERR= 0	00015100

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OF POOR QUALITY

ISN 0024		NCHOSE(1)=6	00015110
ISN 0025		NCHOSE(2)=2	00015120
ISN 0026		NCHOSE(3)=4	00015130
ISN 0027		NCHOSE(4)=9	00015140
ISN 0028		DO 299 I=5,8	00015150
ISN 0029	299	NCHOSE(I)=1	00015160
	C		00015170
ISN 0030		II= IDB(5) + 1	00015180
ISN 0031		JJ= IDB(6) + 1	00015190
ISN 0032		ICHOSE(7) = DATAB(1,II)	00015200
ISN 0033		ICHOSE(8) = DATAB(1,JJ)	00015210
	C		00015220
ISN 0034	3	CONTINUE	00015230
	C		00015240
	C		00015250
	C	THRUSTER SELECTION	00015260
	C		00015270
	C	FIRST CHECK TO SEE IF THERE IS AN ACCEPTABLE THRUSTER IN THE DATA	00015280
	C	BASE	00015290
	C		00015300
ISN 0035		JIE= IDB(1)	00015310
ISN 0036		J1= 1	00015320
ISN 0037	10	THRUST= DATAB(6,J1)	00015330
ISN 0038		IF(THRUST.GE.FMAX) GO TO 12	00015340
ISN 0040		IF(J1.EQ.JIE) GO TO 11	00015350
ISN 0042		J1= J1 + 1	00015360
ISN 0043		GO TO 10	00015370
	C		00015380
	C	NO ACCEPTABLE THRUSTERS	00015390
	C		00015400
ISN 0044	11	ICHOSE(1)= -1	00015410
ISN 0045		RETURN	00015420
	C		00015430
	C	AT LEAST ONE ACCEPTABLE THRUSTER	00015440
	C		00015450
ISN 0046	12	CONTINUE	00015460
	C		00015470
	C	SELECT PNEUMATIC ATTITUDE AND CONTROL THRUSTERS	00015480
	C		00015490

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	C	FIRST DETERMINE SET OF ALL THRUSTERS WHICH SATISFY THE INEQUALITY	00015500
	C	THRUST GE ACTHST	00015510
	C		00015520
ISN 0047		I= 1	00015530
ISN 0048		J1= 1	00015540
ISN 0049	13	THRUST= DATAB(6,J1)	00015550
ISN 0050		IF(THRUST.GE.ACTHST) GO TO 15	00015560
ISN 0052	14	IF(J1.EQ.J1E) GO TO 16	00015570
ISN 0054		J1= J1 + 1	00015580
ISN 0055		GO TO 13	00015590
ISN 0056	15	IACCPT(I)= J1	00015600
ISN 0057		I= I + 1	00015610
ISN 0058		GO TO 14	00015620
ISN 0059	16	CONTINUE	00015630
ISN 0060		IMAX= I - 1	00015640
	C		00015650
	C	CHOOSE THAT THRUSTER FROM THE ABOVE SET WHICH MINIMIZES THE	00015660
	C	QUANTITY, ABS(THRUST - ACTHST)	00015670
	C		00015680
ISN 0061		I=1	00015690
ISN 0062		J1= IACCPT(I)	00015700
ISN 0063		THRUST= DATAB(6,J1)	00015710
ISN 0064		DIFOLD= ABS(THRUST - ACTHST)	00015720
ISN 0065	17	ICHOSE(I)= DATAB(I,J1)	00015730
ISN 0066		JSAVE=J1	00015740
ISN 0067		IF(I.EQ.IMAX) GO TO 20	00015750
ISN 0069	18	I= I + 1	00015760
ISN 0070		J1= IACCPT(I)	00015770
ISN 0071		THRUST= DATAB(6,J1)	00015780
ISN 0072		DIFNEW= ABS(THRUST - ACTHST)	00015790
ISN 0073		IF(DIFNEW.LE.DIFOLD) GO TO 19	00015800
ISN 0075		IF(I.LT.IMAX) GO TO 18	00015810
ISN 0077		GO TO 20	00015820
ISN 0078	19	DIFOLD= DIFNEW	00015830
ISN 0079		GO TO 17	00015840
ISN 0080	20	J1=JSAVE	00015850
	C		00015860
	C	SELECT PNEUMATIC TRANSLATIONAL THRUSTERS USING ABOVE PROCEDURE	00015870
	C		00015880

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ISN 0081		I= 1	00015890
ISN 0082		J2= 1	00015900
ISN 0083	21	THRUST= DATAB(6,J2)	00015910
ISN 0084		IF(THRUST.GE.TTHST) GO TO 23	00015920
ISN 0086	22	IF(J2.EQ.J1E) GO TO 24	00015930
ISN 0088		J2= J2 + 1	00015940
ISN 0089		GO TO 21	00015950
ISN 0090	23	IACCPT(I)= J2	00015960
ISN 0091		I= I + 1	00015970
ISN 0092		GO TO 22	00015980
ISN 0093	24	CONTINUE	00015990
ISN 0094		IMAX= I - 1	00016000
ISN 0095		I= I	00016010
ISN 0096		J2= IACCPT(I)	00016020
ISN 0097		THRUST= DATAB(6,J2)	00016030
ISN 0098		DIFOLD= ABS(THRUST - TTHST)	00016040
ISN 0099	25	ICH0SE(2)= DATAB(1,J2)	00016050
ISN 0100		JSAVE=J2	00016060
ISN 0101		IF(I.EQ.IMAX) GO TO 28	00016070
ISN 0103	26	I= I + 1	00016080
ISN 0104		J2= IACCPT(I)	00016090
ISN 0105		THRUST= DATAB(6,J2)	00016100
ISN 0106		DIFNEW= ABS(THRUST - TTHST)	00016110
ISN 0107		IF(DIFNEW.LE.DIFOLD) GO TO 27	00016120
ISN 0109		IF(I.LT.IMAX) GO TO 26	00016130
ISN 0111		GO TO 28.	00016140
ISN 0112	27	DIFOLD= DIFNEW	00016150
ISN 0113		GO TO 25	00016160
ISN 0114	28	J2=JSAVE	00016170
	C		00016180
	C	THRUSTERS HAVE BEEN SELECTED	00016190
	C		00016200
	C	SET NUMBER OF EACH TYPE OF THRUSTER	00016210
	C		00016220
	C		00016230
	C		00016240
	C	CHECK TO SEE IF CYCLE LIFE REQUIREMENT IS SATISFIED	00016250
	C		00016260
ISN 0115		IERR= 0	00016270

ISN 0116		IF(DATAB(7,J1).LT.CLIFE) IERR= 1	00016280
ISN 0118		IF(DATAB(7,J2).LT.CLIFE) IERR= IERR + 10	00016290
	C		00016300
	C	IERR= 1 IMPLIES THAT THE CYCLE LIFE OF THE ATTITUDE AND CONTROL	00016310
	C	THRUSTERS IS TOO SHORT. IERR= 10 IMPLIES THAT THE CYCLE LIFE OF	00016320
	C	THE TRANSLATIONAL THRUSTERS IS TOO SHORT. IERR= 11 IMPLIES THAT	00016330
	C	THE CYCLE LIVES OF BOTH THRUSTERS ARE TOO SHORT	00016340
	C		00016350
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF PNEUMATIC ISOLATION	00016360
	C	VALVES AND FILTERS	00016370
	C		00016380
ISN 0120		PTI=DATAB(8,J1)	00016390
ISN 0121		RHO= 1.02E-7*PTI	00016400
ISN 0122		WDOTPR= (3.*ACTHST + 2.*TTHST)/65.	00016410
ISN 0123		CDALSO= WDOTPR/SQRT(200.*RHO/1.29E-3)	00016420
ISN 0124		RMAX= 200./WDOTPR**2	00016430
	C		00016440
	C	SET LAST EQUIPMENT INDICES	00016450
	C		00016460
9-134 ISN 0125		J3E= IDB(2)	00016470
ISN 0126		J4E= IDB(3)	00016480
ISN 0127		J5E= IDB(4)	00016490
ISN 0128		J6E= IDB(5)	00016500
	C	DETERMINE HARDWARE INDICES	00016510
ISN 0129		DO 30 I=1,9	00016520
ISN 0130		IF(IPIC(I).NL.0) GO TO 31	00016530
ISN 0132	30	CONTINUE	00016540
ISN 0133		GO TO 4	00016550
	C		00016560
ISN 0134	31	IF(ITER.NE.0) GO TO 5	00016570
ISN 0136		IF(IPIC(1).LT.J3E) GO TO 6	00016580
ISN 0138		IF(IPIC(2).LT.J4E) GO TO 7	00016590
ISN 0140		IF(IPIC(3).LT.J5E) GO TO 8	00016600
ISN 0142		IF(IPIC(4).LT.J6E) GO TO 9	00016610
	C		00016620
	C	NO ACCEPTABLE COMBINATIONS	00016630
	C		00016640
ISN 0144		ICHOSE(1)= -1	00016650
ISN 0145		RETURN	00016660

ISN 0146	C	4 CONTINUE	00016670
	C		00016680
ISN 0147		J3= IDB(1) + 1	00016690
ISN 0148		J4= IDB(2) + 1	00016700
ISN 0149		J5= IDB(3) + 1	00016710
ISN 0150		J6= IDB(4) + 1	00016720
ISN 0151	C	GO TO 1200	00016730
	C		00016740
ISN 0152		5 CONTINUE	00016750
ISN 0153		J3= IPIC(1)	00016760
ISN 0154		J4= IPIC(2)	00016770
ISN 0155		J5= IPIC(3)	00016780
ISN 0156		J6= IPIC(4)	00016790
ISN 0157		GO TO 1200	00016800
	C		00016810
ISN 0158		6 CONTINUE	00016820
ISN 0159		J3= IPIC(1) + 1	00016830
ISN 0160		J4= IPIC(2)	00016840
ISN 0161		J5= IPIC(3)	00016850
ISN 0162		J6= IPIC(4)	00016860
ISN 0163		GO TO 1200	00016870
	C		00016880
ISN 0164		7 CONTINUE	00016890
ISN 0165		J3= IDB(1) + 1	00016900
ISN 0166		J4= IPIC(2) + 1	00016910
ISN 0167		J5= IPIC(3)	00016920
ISN 0168		J6= IPIC(4)	00016930
ISN 0169		GO TO 1200	00016940
	C		00016950
ISN 0170		8 CONTINUE	00016960
ISN 0171		J3= IDB(1) + 1	00016970
ISN 0172		J4= IDB(2) + 1	00016980
ISN 0173		J5= IPIC(3) + 1	00016990
ISN 0174		J6= IPIC(4)	00017000
ISN 0175		GO TO 1200	00017010
	C		00017020
ISN 0176		9 CONTINUE	00017030
			00017040
			00017050

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ISN 0177		J3= IDB(1) + 1	00017060
ISN 0178		J4= IDB(2) + 1	00017070
ISN 0179		J5= IDB(3) + 1	00017080
ISN 0180		J6= IPIC(4) + 1	00017090
ISN 0181	C	1200 CONTINUE	00017100
	C		00017110
	C	THE HARDWARE INDICES ARE SET	00017120
	C		00017130
ISN 0182	C	32 IF(DATAB(7,J3).LT.CDAISO.OR.DATAB(7,J4).GT.RMAX) GO TO 33	00017140
	C		00017150
	C	ISOLATION VALVE AND FILTER ARE ACCEPTABLE	00017160
	C		00017170
ISN 0184		DELPIS = (1.29E-3/RHO)*(WDOTPR/DATAB(7,J3))**2	00017180
ISN 0185		DELPFI = DATAB(7,J4)*WDOTPR**2	00017190
ISN 0186		ICHOSE(3)= DATAB(1,J3)	00017200
ISN 0187		ICHOSE(4)= DATAB(1,J4)	00017210
	C		00017220
	C	PRFLIMINARY CALCULATIONS FOR SELECTION OF REGULATOR AND TANK	00017230
	C		00017240
ISN 0188		PREG= PTI + 2.*DELPIS + DELPFI	00017250
ISN 0189		CDAREG= WDOTPR/SQRT(5600.*PREG/1.27E4)	00017260
ISN 0190		WPR= 1.1*TOTIMP/65.	00017270
ISN 0191		ACSWP= WPR	00017280
ISN 0192		VPRT= 3.4E3*WPR/28.	00017290
ISN 0193		IF(PREG.LT.DATAB(8,J5).OR.PREG.GT.DATAB(9,J5).OR.DATAB(7,J5).LT. * CDAREG.OR.DATAB(6,J6).LT.VPRT) GO TO 33	00017300
	C		00017310
	C	REGULATOR AND TANK ARE ACCEPTABLE	00017320
ISN 0195		ICHOSE(5)= DATAB(1,J5)	00017330
ISN 0196		ICHOSE(6)= DATAB(1,J6)	00017340
ISN 0197		TNKWT= DATAB(23,J6)	00017350
	C		00017360
	C	SIZE PLUMBING AND CONNECTORS	00017370
	C		00017380
ISN 0198		PCWATE = .2*DATAB(23,J6)	00017390
	C		00017400
	C	STORE LAST INDICES ACCEPTABLE	00017410
	C		00017420
	C		00017430
	C		00017440

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ISN 0199		IPIC(1)= J3	00017450
ISN 0200		IPIC(2)= J4	00017460
ISN 0201		IPIC(3)= J5	00017470
ISN 0202		IPIC(4)= J6	00017480
ISN 0203		N(7)= II	00017490
ISN 0204		N(8)= JJ	00017500
ISN 0205		N(1)= J1	00017510
ISN 0206		N(2)= J2	00017520
ISN 0207		N(3)= J3	00017530
ISN 0208		N(4)= J4	00017540
ISN 0209		N(5)= J5	00017550
ISN 0210		N(6)= J6	00017560
ISN 0211		DD 322 I=1,8	00017570
ISN 0212		J= N(I)	00017580
ISN 0213		WT= WT + NCHOSE(I)*DATAB(23,J)	00017590
ISN 0214		VOL= VOL + NCHOSE(I)*DATAB(24,J)	00017600
ISN 0215		PL= PL + NCHOSE(I)*DATAB(16,J)	00017610
ISN 0216		PLMIN= PLMIN + NCHOSE(I)*DATAB(18,J)	00017620
ISN 0217	322	CONTINUE	00017630
ISN 0218		WT= WT + ACSWP + PCWATE	00017640
ISN 0219		RETURN	00017650
	C		00017660
ISN 0220	33	CONTINUE	00017670
	C		00017680
	C	HARDWARE SELECTION NOT ACCEPTABLE - INCREMENT HARDWARE INDICES	00017690
	C		00017700
ISN 0221		IF(J3.LT.J3E) GO TO 34	00017710
ISN 0223		IF(J4.LT.J4E) GO TO 35	00017720
ISN 0225		IF(J5.LT.J5E) GO TO 36	00017730
ISN 0227		IF(J6.LT.J6E) GO TO 37	00017740
	C		00017750
	C	NO ACCEPTABLE HARDWARE COMBINATION	00017760
	C		00017770
ISN 0229		ICHOSE(1)= -1	00017780
ISN 0230		RETURN	00017790
	C		00017800
ISN 0231	34	J3= J3 + 1	00017810
ISN 0232		GO TO 32	00017820
ISN 0233	35	J3= IDB(1) + 1	00017830

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ISN 0234		J4= J4 + 1		00017840
ISN 0235		GO TO 32		00017850
ISN 0236	36	J3= IDB(1) + 1		00017860
ISN 0237		J4= IDB(2) + 1		00017870
ISN 0238		J5= J5 + 1		00017880
ISN 0239		GO TO 32		00017890
ISN 0240	37	J3= IDB(1) + 1		00017900
ISN 0241		J4= IDB(2) + 1		00017910
ISN 0242		J5= IDB(3) + 1		00017920
ISN 0243		J6= J6 + 1		00017930
ISN 0244		GO TO 32		00017940
ISN 0245	38	CONTINUE		00017950
ISN 0246		IF(NCONF(2).EQ.3) GO TO 62		00017960
	C			00017970
	C			00017980
	C	THIS IS MONOPROPELLANT CONFIGURATION		00017990
	C			00018000
	C	DETERMINE MAXIMUM THRUST FROM SANDC		00018010
	C			00018020
ISN 0248		FMAX= AMAX1(ACTHST,TTHST)		00018030
ISN 0249		IF(FMAX.LT.1000..AND.TOTIMP.LT.200000..AND.TOTIMP.GE.10000.) GO		00018040
		* TO 39		00018050
	C			00018060
	C	THIS IS NOT AN ACCEPTABLE CONFIGURATION		00018070
	C			00018080
ISN 0251		ICHOSE(1)= -1		00018090
ISN 0252		RETURN		00018100
	C			00018110
ISN 0253	39	CONTINUE		00018120
ISN 0254		VFTMAX=0.		00018125
ISN 0255		IF(ITER.NE.0) GO TO 42		00018130
	C			00018140
	C	INITIALIZE ICHOSE,NCHOSE,IERR AND SELECT HARDWARE NOT SIZED		00018150
	C	I.E., THE RELIEF VALVE,FILL AND VENT VALVE AND FILL AND DRAIN		00018160
	C	VALVE		00018170
	C			00018180
ISN 0257		DO 40 I= 1,14		00018190
ISN 0258		ICHOSE(I)= 0		00018200
ISN 0259	40	NCHOSE(I)= 0		00018210

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ISN 0260		IERR= 0	00018220
ISN 0261		NCHOSE(1)=6	00018230
ISN 0262		NCHOSE(2)=2	00018240
ISN 0263		NCHOSE(3)=4	00018250
ISN 0264		NCHOSE(4)=9	00018260
ISN 0265		DO 41 I=5,11	00018270
ISN 0266		41 NCHOSE(I)=1	00018280
	C		00018290
ISN 0267		II= IDB(5) + 1	00018300
ISN 0268		JJ= IDB(6) + 1	00018310
ISN 0269		KK= IDB(11) + 1	00018320
ISN 0270		ICHOSE(9) = DATAB(1,JJ)	00018330
ISN 0271		ICHOSE(10)= DATAB(1,KK)	00018340
ISN 0272		ICHOSE(11)= DATAB(1,II)	00018350
	C		00018360
ISN 0273		42 CONTINUE	00018370
	C		00018380
	C	THRUSTER SELECTION	00018390
	C		00018400
	C	FIRST CHECK TO SEE IF THERE IS AN ACCEPTABLE THRUSTER IN THE DATA	00018410
	C	BASE	00018420
	C		00018430
ISN 0274		J1E= IDB(8)	00018440
ISN 0275		J1 = IDB(7) + 1	00018450
ISN 0276		100 THRUST= DATAB(6,J1)	00018460
ISN 0277		IF(THRUST.GE.FMAX) GO TO 120	00018470
ISN 0279		IF(J1.EQ.J1E) GO TO 110	00018480
ISN 0281		J1= J1 + 1	00018490
ISN 0282		GO TO 100	00018500
	C		00018510
	C	NO ACCEPTABLE THRUSTERS	00018520
	C		00018530
ISN 0283		110 ICHOSE(1)= -1	00018540
ISN 0284		RETURN	00018550
	C		00018560
	C	AT LEAST ONE ACCEPTABLE THRUSTER	00018570
	C		00018580
ISN 0285		120 CONTINUE	00018590
	C		00018600

	C	SELECT PNEUMATIC ATTITUDE AND CONTROL THRUSTERS	00018610
	C		00018620
	C	FIRST DETERMINE SET OF ALL THRUSTERS WHICH SATISFY THE INEQUALITY	00018630
	C	THRUST GE ACTHST	00018640
	C		00018650
ISN 0286		I= 1	00018660
ISN 0287		J1 = IDB(7) + 1	00018670
ISN 0288	130	THRUST= DATAB(6,J1)	00018680
ISN 0289		IF(THRUST.GE.ACTHST) GO TO 150	00018690
ISN 0291	140	IF(J1.EQ.J1E) GO TO 160	00018700
ISN 0293		J1= J1 + 1	00018710
ISN 0294		GO TO 130	00018720
ISN 0295	150	IACCPT(I)= J1	00018730
ISN 0296		I= 1 + 1	00018740
ISN 0297		GO TO 140	00018750
ISN 0298	160	CONTINUE	00018760
ISN 0299		IMAX= I - 1	00018770
	C		00018780
	C	CHOOSE THAT THRUSTER FROM THE ABOVE SET WHICH MINIMIZES THE	00018790
	C	QUANTITY, ABS(THRUST - ACTHST)	00018800
	C		00018810
ISN 0300		I=I	00018820
ISN 0301		J1= IACCPT(I)	00018830
ISN 0302		THRUST= DATAB(6,J1)	00018840
ISN 0303		DIFOLD= ABS(THRUST - ACTHST)	00018850
ISN 0304	170	ICHOSE(1)= DATAB(1,J1)	00018860
ISN 0305		JSAVE=J1	00018870
ISN 0306		IF(I.EQ.IMAX) GO TO 200	00018880
ISN 0308	180	I= I + 1	00018890
ISN 0309		J1= IACCPT(I)	00018900
ISN 0310		THRUST= DATAB(6,J1)	00018910
ISN 0311		DIFNEW= ABS(THRUST - ACTHST)	00018920
ISN 0312		IF(DIFNEW.LE.DIFOLD) GO TO 190	00018930
ISN 0314		IF(I.LT.IMAX) GO TO 180	00018940
ISN 0316		GO TO 200	00018950
ISN 0317	190	DIFOLD= DIFNEW	00018960
ISN 0318		GO TO 170	00018970
ISN 0319	200	J1=JSAVE	00018980
			00018990

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	C	SELECT PNEUMATIC TRANSLATIONAL THRUSTERS USING ABOVE PROCEDURE	00019000
	C		00019010
ISN 0320		I= 1	00019020
ISN 0321		J2 = IDB(7) + 1	00019030
ISN 0322	210	THRUST= DATAB(6,J2)	00019040
ISN 0323		IF(THRUST.GE.TTHST) GO TO 230	00019050
ISN 0325	220	IF(J2.EQ.J1E) GO TO 240	00019060
ISN 0327		J2= J2 + 1	00019070
ISN 0328		GO TO 210	00019080
ISN 0329	230	IACCPT(I)= J2	00019090
ISN 0330		I= I + 1	00019100
ISN 0331		GO TO 220	00019110
ISN 0332	240	CONTINUE	00019120
ISN 0333		IMAX= I - 1	00019130
ISN 0334		I= 1	00019140
ISN 0335		J2= IACCPT(I)	00019150
ISN 0336		THRUST= DATAB(6,J2)	00019160
ISN 0337		DIFOLD= ABS(THRUST - TTHST)	00019170
ISN 0338	250	ICHOSE(2)= DATAB(1,J2)	00019180
ISN 0339		JSAVE=J2	00019190
ISN 0340		IF(I.EQ.IMAX) GO TO 280	00019200
ISN 0342	260	I= I + 1	00019210
ISN 0343		J2= IACCPT(I)	00019220
ISN 0344		THRUST= DATAB(6,J2)	00019230
ISN 0345		DIFNEW= ABS(THRUST - TTHST)	00019240
ISN 0346		IF(DIFNEW.LE.DIFOLD) GO TO 270	00019250
ISN 0348		IF(I.LT.IMAX) GO TO 260	00019260
ISN 0350		GO TO 280	00019270
ISN 0351	270	DIFOLD= DIFNEW	00019280
ISN 0352		GO TO 250	00019290
ISN 0353	280	J2=JSAVE	00019300
	C		00019310
	C	THRUSTERS HAVE BEEN SELECTED	00019320
	C		00019330
	C	SET NUMBER OF EACH TYPE OF THRUSTER	00019340
	C		00019350
	C		00019360
	C		00019370
	C	CHECK TO SEE IF CYCLE LIFE REQUIREMENT IS SATISFIED	00019380

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ISN 0354		IERR= 0	00019390
ISN 0355		IF(DATAB(7,J1).LT.CLIFE) IERR= 1	00019400
ISN 0357		IF(DATAB(7,J2).LT.CLIFE) IERR= IERR + 10	00019410
	C		00019420
	C	IERR= 1 IMPLIES THAT THE CYCLE LIFE OF THE ATTITUDE AND CONTROL	00019430
	C	THRUSTERS IS TOO SHORT. IERR= 10 IMPLIES THAT THE CYCLE LIFE OF	00019440
	C	THE TRANSLATIONAL THRUSTERS IS TOO SHORT. IERR= 11 IMPLIES THAT	00019450
	C	THE CYCLE LIVES OF BOTH THRUSTERS ARE TOO SHORT	00019460
	C		00019470
	C		00019480
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF MONOPROPELLANT ISOLATION	00019490
	C	VALVES AND FILTERS	00019500
	C		00019510
ISN 0359		RHOF= .036	00019520
ISN 0360		WDOTF=(3.*ACTHST + 2.*TTHST)/200.	00019530
ISN 0361		IF (NCONF(1) .EQ. 1) WDOTF=TTHST/200.	00019540
ISN 0363		CDAISO= WDOTF/SQRT(50.*RHOF/1.29E-3)	00019545
ISN 0364		RMAX = 50./WDOTF**2	00019550
	C		00019560
	C		00019570
	C	SET LAST EQUIPMENT INDICES	00019580
	C		00019590
ISN 0365		J3E= IDB(9)	00019600
ISN 0366		J4E= IDB(10)	00019610
ISN 0367		J5E= IDB(4)	00019620
ISN 0368		J6E= IDB(2)	00019630
ISN 0369		J7E= IDB(11)	00019640
ISN 0370		J8E= IDB(5)	00019650
	C		00019660
	C	DETERMINE HARDWARE INDICES	00019670
	C		00019680
ISN 0371		DO 43 I=1,9	00019690
ISN 0372		IF(IPIC(1).NE.0) GO TO 44	00019700
ISN 0374	43	CONTINUE	00019710
ISN 0375		GO TO 45	00019720
ISN 0376	44	IF(ITER.NE.0) GO TO 46	00019730
ISN 0378		IF(IPIC(1).LT.J3E) GO TO 47	00019740
ISN 0380		IF(IPIC(2).LT.J4E) GO TO 48	00019750
			00019760

ISN 0382		IF(IPIC(3).LT.J5E) GO TO 49	00019770
ISN 0384		IF(IPIC(4).LT.J6E) GO TO 50	00019780
ISN 0386		IF(IPIC(5).LT.J7E) GO TO 51	00019790
ISN 0388		IF(IPIC(6).LT.J8E) GO TO 52	00019800
	C		00019810
	C	NO. ACCEPTABLE COMBINATIONS	00019820
	C		00019830
ISN 0390		ICHOSE(1)= -1	00019840
ISN 0391		RETURN	00019850
	C		00019860
ISN 0392		45 CONTINUE	00019870
	C		00019880
ISN 0393		J3= IDB(8) + 1	00019890
ISN 0394		J4= IDB(9) + 1	00019900
ISN 0395		J5= IDB(3) + 1	00019910
ISN 0396		J6= IDB(1) + 1	00019920
ISN 0397		J7= IDB(10) + 1	00019930
ISN 0398		J8= IDB(4) + 1	00019940
ISN 0399		GO TO 53	00019950
	C		00019960
ISN 0400		46 CONTINUE	00019970
9-143 ISN 0401		J3= IPIC(1)	00019980
ISN 0402		J4= IPIC(2)	00019990
ISN 0403		J5= IPIC(3)	00020000
ISN 0404		J6= IPIC(4)	00020010
ISN 0405		J7= IPIC(5)	00020020
ISN 0406		J8= IPIC(6)	00020030
ISN 0407		GO TO 53	00020040
	C		00020050
ISN 0408		47 J3= IPIC(1) + 1	00020060
ISN 0409		J4= IPIC(2)	00020070
ISN 0410		J5= IPIC(3)	00020080
ISN 0411		J6= IPIC(4)	00020090
ISN 0412		J7= IPIC(5)	00020100
ISN 0413		J8= IPIC(6)	00020110
ISN 0414		GO TO 53	00020120
	C		00020130
ISN 0415		48 J3= IDB(8) + 1	00020140
ISN 0416		J4= IPIC(2) + 1	00020150

ISN 0417		J5= IPIC (3)	00020160
ISN 0418		J6= IPIC (4)	00020170
ISN 0419		J7= IPIC (5)	00020180
ISN 0420		J8= IPIC (6)	00020190
ISN 0421		GO TO 53	00020200
	C		00020210
ISN 0422	49	J3= IDB (8) + 1	00020220
ISN 0423		J4= IDB (9) + 1	00020230
ISN 0424		J5= IPIC (3) + 1	00020240
ISN 0425		J6= IPIC (4)	00020250
ISN 0426		J7= IPIC (5)	00020260
ISN 0427		J8= IPIC (6)	00020270
ISN 0428		GO TO 53	00020280
	C		00020290
ISN 0429	50	J3= IDB (8) + 1	00020300
ISN 0430		J4= IDB (9) + 1	00020310
ISN 0431		J5= IDB (3) + 1	00020320
ISN 0432		J6= IPIC (4) + 1	00020330
9-144 ISN 0433		J7= IPIC (5)	00020340
ISN 0434		J8= IPIC (6)	00020350
ISN 0435		GO TO 53	00020360
	C		00020370
ISN 0436	51	J3= IDB (8) + 1	00020380
ISN 0437		J4= IDB (9) + 1	00020390
ISN 0438		J5= IDB (3) + 1	00020400
ISN 0439		J6= IDB (1) + 1	00020410
ISN 0440		J7= IPIC (5) + 1	00020420
ISN 0441		J8= IPIC (6)	00020430
ISN 0442		GO TO 53	00020440
	C		00020450
ISN 0443	52	J3= IDB (8) + 1	00020460
ISN 0444		J4= IDB (9) + 1	00020470
ISN 0445		J5= IDB (3) + 1	00020480
ISN 0446		J6= IDB (1) + 1	00020490
ISN 0447		J7= IDB (10) + 1	00020500
ISN 0448		J8= IPIC (6) + 1	00020510
	C		00020520
ISN 0449	53	CONTINUE	00020530
	C		00020540

	C	THE HARDWARE INDICES ARE SET	00020550
	C		00020560
ISN 0450		54 IF(DATAB(7,J3).LT.CDAISO.OR.DATAB(7,J4).GT.RMAX) GO TO 55	00020570
	C		00020580
	C	FUEL CIRCUIT ISOLATION VALVES AND FILTERS ARE ACCEPTABLE	00020590
	C		00020600
ISN 0452		DELPIS= (1.29E-3/RHOF)*(WDOTF/DATAB(7,J3))**2	00020610
ISN 0453		DELPFI= DATAB(7,J4)*WDOTF**2	00020620
ISN 0454		ICHOSE(3)= DATAB(1,J3)	00020630
ISN 0455		ICHOSE(4)= DATAB(1,J4)	00020640
ISN 0456		IPIC(1)= J3	00020650
ISN 0457		IPIC(2)= J4	00020660
	C		00020670
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF PNEUMATIC REGULATOR	00020680
	C		00020690
ISN 0458		PTI= DATAB(8,J1)	00020700
ISN 0459		PFT= PTI + 2.*DELPIS + 2.*DELPFI	00020710
ISN 0460		PREG= PFT + 2.*DELPIS	00020720
ISN 0461		WDOTPR= 28.*1.02E-7*PREG*WDOTF/RHOF	00020730
ISN 0462		CDAREG= WDOTPR/SQRT(5600.*PREG/1.27E4)	00020740
	C		00020750
ISN 0463		IF(PREG.LT.DATAB(8,J5).OR.PREG.GT.DATAB(9,J5).OR.DATAB(7,J5).LT. * CDAREG) GO TO 55	00020760
	C		00020770
	C	REGULATOR IS ACCEPTABLE	00020780
	C		00020790
ISN 0465		ICHOSE(5)= DATAB(1,J5)	00020800
ISN 0466		IPIC(3)= J5	00020810
	C		00020820
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF PNEUMATIC ISOLATION	00020830
	C	VALVE	00020840
	C		00020850
ISN 0467		RHOPR= 3000.*1.02E-7	00020860
ISN 0468		CDAISO= WDOTPR/SQRT(200.*RHOPR/1.29E-3)	00020870
ISN 0469		IF(DATAB(7,J6).LT.CDAISO) GO TO 55	00020880
	C		00020890
	C	PNEUMATIC ISOLATION VALVE IS ACCEPTABLE	00020900
	C		00020910
ISN 0471		ICHOSE(6)= DATAB(1,J6)	00020920
			00020930



ISN 0472		IPIC(4)= J6	00020940
	C		00020950
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF FUEL TANK AND PNEUMATIC	00020960
	C	TANK	00020970
	C		00020980
ISN 0473		WF= 1.1*TOTIMP/200.	00020990
ISN 0474		VF= WF/.036	00021010
ISN 0475		VFT= 1.1*VF	00021020
ISN 0476		VPRT= PFT*VFT/(3000. - 2.*PFT)	00021030
ISN 0477		WPRT=.0085*VPRT	00021032
ISN 0478		ACSWP=WF+WPRT	00021034
ISN 0479		IF (J7 .EQ. IOB(10)+1) JSAVE=J7	00021040
	C	IF (DATAB(6,J7).LT.VFT.OR.DATAB(7,J7).LT.PFT.OR.DATAB(6,J8).LT.	00021050
	C	* VPRT) GO TO 55	00021058
ISN 0481		IF (DATAB(6,J8) .LT. VPRT) GO TO 55	00021059
ISN 0483		IF (J7 .EQ. J7E .AND. DATAB(7,J7) .LT. PFT) GO TO 555	00021060
ISN 0485		IF (DATAB(7,J7) .LT. PFT .OR. DATAB(6,J8) .LT. VPRT) GO TO 55	00021061
ISN 0487		IF (DATAB(6,J7) .GE. VFT) GO TO 550	00021062
ISN 0489		IF (DATAB(6,J7) .GT. VFTMAX) J7SAVE=J7	00021063
ISN 0491		IF (DATAB(6,J7) .GT. VFTMAX) VFTMAX=DATAB(6,J7)	00021064
ISN 0493		IF (J7 .LT. J7E) GO TO 55	00021065
ISN 0495	555	NCHOSE(7)=VFT/DATAB(6,J7SAVE)+.5	00021067
ISN 0496		J7=J7SAVE	00021068
ISN 0497	550	ICHOSE(7)=DATAB(1,J7)	00021069
	C	FUEL TANK AND PNEUMATIC TANK ARE ACCEPTABLE	00021080
	C		00021090
	C	ICHOSE(7)= DATAB(1,J7)	00021100
ISN 0498		ICHOSE(8)= DATAB(1,J8)	00021110
ISN 0499		TNKWT= DATAB(23,J7)	00021120
	C		00021130
	C	SIZE PLUMBING AND CONNECTORS	00021140
	C		00021150
ISN 0500		PCWATE= .2*(DATAB(23,J7) + DATAB(23,J8))	00021160
	C		00021170
ISN 0501		IPIC(5)= J7	00021180
ISN 0502		IPIC(6)= J8	00021190
ISN 0503		N(9)= JJ	00021200
ISN 0504		N(10)= KK	00021210
ISN 0505		N(11)= II	00021220

ISN 0506		N(1)= J1	00021230
ISN 0507		N(2)= J2	00021240
ISN 0508		N(3)= J3	00021250
ISN 0509		N(4)= J4	00021260
ISN 0510		N(5)= J5	00021270
ISN 0511		N(6)= J6	00021280
ISN 0512		N(7)= J7	00021290
ISN 0513		N(8)= J8	00021300
ISN 0514		DO 542 I=1,11	00021310
ISN 0515		J= N(I)	00021320
ISN 0516		WT= WT + NCHOSE(I)*DATAB(23,J)	00021330
ISN 0517		VOL= VOL + NCHOSE(I)*DATAB(24,J)	00021340
ISN 0518		PL= PL + NCHOSE(I)*DATAB(16,J)	00021350
ISN 0519		PLMIN= PLMIN + NCHOSE(I)*DATAB(18,J)	00021360
ISN 0520	542	CONTINUE	00021370
ISN 0521		WT= WT + ACSWP + PCWATE	00021380
ISN 0522		RETURN	00021390
	C		00021400
ISN 0523	55	CONTINUE	00021410
	C		00021420
	C	HARDWARE SELECTION NOT ACCEPTABLE - INCREMENT HARDWARE INDICES.	00021430
	C		00021440
ISN 0524		IF(J3.LT.J3E) GO TO 56	00021450
ISN 0526		IF(J4.LT.J4E) GO TO 57	00021460
ISN 0528		IF(J5.LT.J5E) GO TO 58	00021470
ISN 0530		IF(J6.LT.J6E) GO TO 59	00021480
ISN 0532		IF(J7.LT.J7E) GO TO 60	00021490
ISN 0534		IF(J8.LT.J8E) GO TO 61	00021500
	C		00021510
	C	NO ACCEPTABLE HARDWARE	00021520
	C		00021530
ISN 0536		ICHOSE(1)= -1	00021540
ISN 0537		RETURN	00021550
	C		00021560
ISN 0538	56	J3= J3 + 1	00021570
ISN 0539		GO TO 54	00021580
ISN 0540	57	J3= IDB(8) + 1	00021590
ISN 0541		J4= J4 + 1	00021600
ISN 0542		GO TO 54	00021610

ISN 0543	58	J3= IDR(8) + 1	00021620
ISN 0544		J4= IDB(9) + 1	00021630
ISN 0545		J5= J5 + 1	00021640
ISN 0546		GO TO 54	00021650
ISN 0547	59	J3= IDB(8) + 1	00021660
ISN 0548		J4= IDB(9) + 1	00021670
ISN 0549		J5= IDB(3) + 1	00021680
ISN 0550		J6= J6 + 1	00021690
ISN 0551		GO TO 54	00021700
ISN 0552	60	J3= IDB(8) + 1	00021710
ISN 0553		J4= IDB(9) + 1	00021720
ISN 0554		J5= IDB(3) + 1	00021730
ISN 0555		J6= IDB(1) + 1	00021740
ISN 0556		J7= J7 + 1	00021750
ISN 0557		GO TO 54	00021760
ISN 0558	61	J3= IDB(8) + 1	00021770
ISN 0559		J4= IDB(9) + 1	00021780
ISN 0560		J5= IDB(3) + 1	00021790
ISN 0561		J6= IDB(1) + 1	00021800
ISN 0562		J7= IDB(10) + 1	00021810
ISN 0563		VFTMAX=0.	00021811
ISN 0564		J8= J8 + 1	00021820
ISN 0565		GO TO 54	00021830
	C		00021840
ISN 0566	62	CONTINUE	00021850
	C		00021860
	C	THIS IS BIPROPELLANT CONFIGURATION	00021870
	C		00021880
ISN 0567		IF(TOTIMP.GE.50000.) GO TO 63	00021890
	C		00021900
	C	THIS IS NOT AN ACCEPTABLE CONFIGURATION	00021910
	C		00021920
ISN 0569		ICHOSE(1)= -1	00021930
ISN 0570		RETURN	00021940
	C		00021950
ISN 0571	63	CONTINUE	00021960
	C		00021970
	C		00021980
ISN 0572		IF(ITER.NE.0) GO TO 65	00021990

	C		00022000
	C	INITIALIZE ICHOSE,NCHOSE,IERR AND SELECT HARDWARE NOT SIZED	00022010
	C	I.F., FILL AND DRAIN VALVES,FILL AND VENT VALVE AND RELIEF	00022020
	C	VALVE	00022030
	C		00022040
ISN 0574		DO 64 I=1,14	00022050
ISN 0575		ICHOSE(I)= 0	00022060
ISN 0576	64	NCHOSE(I)= 0	00022070
ISN 0577		IERR= 0	00022080
ISN 0578		NCHOSE(1)=6	00022090
ISN 0579		NCHOSE(2)=2	00022100
ISN 0580		NCHOSE(3)=3	00022110
ISN 0581		NCHOSE(4)=3	00022120
ISN 0582		NCHOSE(5)=4	00022130
ISN 0583		NCHOSE(6)=4	00022140
ISN 0584		DO 649 I=7,11	00022150
ISN 0585	649	NCHOSE(I)=1	00022160
ISN 0586		NCHOSE(12)=2	00022170
ISN 0587		NCHOSE(13)=1	00022180
ISN 0588		NCHOSE(14)=1	00022190
ISN 0589		II= IDB(5) + 1	00022200
ISN 0590		JJ= IDB(6) + 1	00022210
ISN 0591		KK= IDB(16) + 1	00022220
ISN 0592		ICHOSE(12)= DATAB(1,KK)	00022230
ISN 0593		ICHOSE(13)= DATAB(1,II)	00022240
ISN 0594		ICHOSE(14)= DATAB(1,JJ)	00022250
	C		00022260
ISN 0595	65	CONTINUE	00022270
	C		00022280
	C	THRUSTER SELECTION	00022290
	C		00022300
	C	FIRST CHECK TO SEE IF THERE IS AN ACCEPTABLE THRUSTER IN THE DATA	00022310
	C	BASE	00022320
	C		00022330
ISN 0596		FMAX=AMAX1(ACTHST,TTST)	00022340
ISN 0597		J1E= IDB(13)	00022350
ISN 0598		J1 = IDB(12) + 1	00022360
ISN 0599	101	THRUST= DATAB(6,J1)	00022370
ISN 0600		IF(THRUST.GE.FMAX) GO TO 121	00022380

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ISN 0602		IF(J1.EQ.J1E) GO TO 111	00022390
ISN 0604		J1= J1 + 1	00022400
ISN 0605		GO TO 101	00022410
	C		00022420
	C	NO ACCEPTABLE THRUSTERS	00022430
	C		00022440
ISN 0606	111	ICHOSE(1)= -1	00022450
ISN 0607		RETURN	00022460
	C		00022470
	C	AT LEAST ONE ACCEPTABLE THRUSTER	00022480
	C		00022490
ISN 0608	121	CONTINUE	00022500
	C		00022510
	C	SELECT PNEUMATIC ATTITUDE AND CONTROL THRUSTERS	00022520
	C		00022530
	C	FIRST DETERMINE SET OF ALL THRUSTERS WHICH SATISFY THE INEQUALITY	00022540
	C	THRUST GE ACTHST	00022550
	C		00022560
9-150	ISN 0609	I= 1	00022570
	ISN 0610	J1 = IDB(12) + 1	00022580
	ISN 0611	131 THRUST= DATAB(6,J1)	00022590
	ISN 0612	IF(THRUST.GE.ACTHST) GO TO 151	00022600
	ISN 0614	141 IF(J1.EQ.J1E) GO TO 161	00022610
	ISN 0616	J1= J1 + 1	00022620
	ISN 0617	GO TO 131	00022630
	ISN 0618	151 IACCPT(I)= J1	00022640
	ISN 0619	I= I + 1	00022650
	ISN 0620	GO TO 141	00022660
	ISN 0621	161 CONTINUE	00022670
	ISN 0622	IMAX= I - 1	00022680
	C		00022690
	C	CHOOSE THAT THRUSTER FROM THE ABOVE SET WHICH MINIMIZES THE	00022700
	C	QUANTITY, ABS(THRUST - ACTHST)	00022710
	C		00022720
	ISN 0623	I=1	00022730
	ISN 0624	J1= IACCPT(I)	00022740
	ISN 0625	THRUST= DATAB(6,J1)	00022750
	ISN 0626	DIFOLD= ABS(THRUST - ACTHST)	00022760
	ISN 0627	171 ICHOSE(1)= DATAB(1,J1)	00022770

ISN 0628		JSAVE=J1	00022780
ISN 0629		IF(I.EQ.IMAX) GO TO 201	00022790
ISN 0631	181	I= I + 1	00022800
ISN 0632		J1= IACCPT(I)	00022810
ISN 0633		THRUST= DATAB(6,J1)	00022820
ISN 0634		DIFNEW= ABS(THRUST - ACTHST)	00022830
ISN 0635		IF(DIFNEW.LE.DIFOLD) GO TO 191	00022840
ISN 0637		IF(I.LT.IMAX) GO TO 181	00022850
ISN 0639		GO TO 201	00022860
ISN 0640	191	DIFOLD= DIFNEW	00022870
ISN 0641		GO TO 171	00022880
ISN 0642	201	J1=JSAVE	00022890
	C		00022900
	C	SELECT PNEUMATIC TRANSLATIONAL THRUSTERS USING ABOVE PROCEDURE	00022910
	C		00022920
ISN 0643		I= 1	00022930
ISN 0644		J2 = IDB(12) + 1	00022940
ISN 0645	211	THRUST= DATAB(6,J2)	00022950
ISN 0646		IF(THRUST.GE.TTHST) GO TO 231	00022960
ISN 0648	221	IF(J2.EQ.J1E) GO TO 241	00022970
ISN 0650		J2= J2 + 1	00022980
ISN 0651		GO TO 211	00022990
ISN 0652	231	IACCPT(I)= J2	00023000
ISN 0653		I= I + 1	00023010
ISN 0654		GO TO 221	00023020
ISN 0655	241	CONTINUE	00023030
ISN 0656		IMAX= I - 1	00023040
ISN 0657		I= 1	00023050
ISN 0658		J2= IACCPT(I)	00023060
ISN 0659		THRUST= DATAB(6,J2)	00023070
ISN 0660		DIFOLD= ABS(THRUST - TTHST)	00023080
ISN 0661	251	ICHOSE(2)= DATAB(1,J2)	00023090
ISN 0662		JSAVE=J2	00023100
ISN 0663		IF(I.EQ.IMAX) GO TO 281	00023110
ISN 0665	261	I= I + 1	00023120
ISN 0666		J2= IACCPT(I)	00023130
ISN 0667		THRUST= DATAB(6,J2)	00023140
ISN 0668		DIFNEW= ABS(THRUST - TTHST)	00023150
ISN 0669		IF(DIFNEW.LE.DIFOLD) GO TO 271	00023160

ISN 0671	IF(I.LT.IMAX) GO TO 261	00023170
ISN 0673	GO TO 281	00023180
ISN 0674	271 DIFOLD= DIFNEW	00023190
ISN 0675	GO TO 251	00023200
ISN 0676	281 J2=JSAVE	00023210
	C	00023220
	C THRUSTERS HAVE BEEN SELECTED	00023230
	C	00023240
	C SET NUMBER OF EACH TYPE OF THRUSTER	00023250
	C	00023260
	C	00023270
	C	00023280
	C CHECK TO SEE IF CYCLE LIFE REQUIREMENT IS SATISFIED	00023290
	C	00023300
ISN 0677	IERR= 0	00023310
ISN 0678	IF(DATAB(7,J1).LT.CLIFE) IERR= 1	00023320
ISN 0680	IF(DATAB(7,J2).LT.CLIFE) IERR= IERR + 10	00023330
	C	00023340
	C IERR= 1 IMPLIES THAT THE CYCLE LIFE OF THE ATTITUDE AND CONTROL	00023350
	C THRUSTERS IS TOO SHORT. IERR= 10 IMPLIES THAT THE CYCLE LIFE OF	00023360
	C THE TRANSLATIONAL THRUSTERS IS TOO SHORT. IERR= 11 IMPLIES THAT	00023370
	C THE CYCLE LIVES OF BOTH THRUSTERS ARE TOO SHORT	00023380
	C	00023390
	C PRELIMINARY CALCULATIONS FOR SELECTION OF BIROPELLANT ISOLATION	00023400
	C VALVES AND FILTERS	00023410
	C	00023420
ISN 0682	RHDF= .032	00023430
ISN 0683	RHDD= .054	00023440
ISN 0684	WDOTF=(3.*ACTHST + 2.*TTHST)/(260.*(1.+XMR))	00023450
ISN 0685	WDOTO= WDOTF*XMR	00023460
ISN 0686	CDATSF= WDOTF/SQRT(50.*RHDF/1.29E-3)	00023470
ISN 0687	CDATSO= WDOTO/SQRT(30.*RHDD/1.29E-3)	00023480
ISN 0688	RMAXF= 50./WDOTF**2	00023490
ISN 0689	RMAXO= 50./WDOTO**2	00023500
	C	00023510
	C SET LAST EQUIPMENT INDICES	00023520
	C	00023530
ISN 0690	J3E= IDB(14)	00023540
ISN 0691	J4E= IDB(14)	00023550

ISN 0692	J5E= IDB(15)	00023560
ISN 0693	J6E= IDB(15)	00023570
ISN 0694	J7E= IDB(4)	00023580
ISN 0695	J8E= IDB(2)	00023590
ISN 0696	J9E= IDB(16)	00023600
ISN 0697	J10E= IDB(16)	00023610
ISN 0698	J11E= IDB(5)	00023620
	C	00023630
	C	00023640
	C	00023650
ISN 0699	DO 66 I=1,9	00023660
ISN 0700	IF(IPIC(1).NE.0) GO TO 67	00023670
ISN 0702	66 CONTINUE	00023680
ISN 0703	GO TO 68	00023690
ISN 0704	67 IF(ITER.NE.0) GO TO 69	00023700
ISN 0706	IF(IPIC(1).LT.J3E) GO TO 70	00023710
ISN 0708	IF(IPIC(2).LT.J4E) GO TO 71	00023720
ISN 0710	IF(IPIC(3).LT.J5E) GO TO 72	00023730
ISN 0712	IF(IPIC(4).LT.J6E) GO TO 73	00023740
ISN 0714	IF(IPIC(5).LT.J7E) GO TO 74	00023750
ISN 0716	IF(IPIC(6).LT.J8E) GO TO 75	00023760
ISN 0718	IF(IPIC(7).LT.J9E) GO TO 76	00023770
ISN 0720	IF(IPIC(8).LT.J10E) GO TO 77	00023780
ISN 0722	IF(IPIC(9).LT.J11E) GO TO 78	00023790
	C	00023800
	C	00023810
	C	00023820
ISN 0724	ICHOSE(1)= -1	00023830
ISN 0725	RETURN	00023840
	C	00023850
ISN 0726	68 J3= IDB(13) + 1	00023860
ISN 0727	J4= IDB(13) + 1	00023870
ISN 0728	J5= IDB(14) + 1	00023880
ISN 0729	J6= IDB(14) + 1	00023890
ISN 0730	J7= IDB(3) + 1	00023900
ISN 0731	J8= IDB(1) + 1	00023910
ISN 0732	J9= IDB(15) + 1	00023920
ISN 0733	J10= IDB(15) + 1	00023930
ISN 0734	J11= IDB(4) + 1	00023940



ISN 0735	GO TO 79	00023950
ISN 0736	C 69 CONTINUE	00023960
ISN 0737	J3= IPIC(1)	00023970
ISN 0738	J4= IPIC(2)	00023980
ISN 0739	J5= IPIC(3)	00023990
ISN 0740	J6= IPIC(4)	00024000
ISN 0741	J7= IPIC(5)	00024010
ISN 0742	J8= IPIC(6)	00024020
ISN 0743	J9= IPIC(7)	00024030
ISN 0744	J10= IPIC(8)	00024040
ISN 0745	J11= IPIC(9)	00024050
ISN 0746	GO TO 79	00024060
ISN 0747	C 70 J3= IPIC(1) + 1	00024070
ISN 0748	J4= IPIC(2)	00024080
ISN 0749	J5= IPIC(3)	00024090
ISN 0750	J6= IPIC(4)	00024100
9-154 ISN 0751	J7= IPIC(5)	00024110
ISN 0752	J8= IPIC(6)	00024120
ISN 0753	J9= IPIC(7)	00024130
ISN 0754	J10= IPIC(8)	00024140
ISN 0755	J11= IPIC(9)	00024150
ISN 0756	GO TO 79	00024160
ISN 0757	C 71 J3= IDB(13) + 1	00024170
ISN 0758	J4= IPIC(2) + 1	00024180
ISN 0759	J5= IPIC(3)	00024190
ISN 0760	J6= IPIC(4)	00024200
ISN 0761	J7= IPIC(5)	00024210
ISN 0762	J8= IPIC(6)	00024220
ISN 0763	J9= IPIC(7)	00024230
ISN 0764	J10= IPIC(8)	00024240
ISN 0765	J11= IPIC(9)	00024250
ISN 0766	GO TO 79	00024260
ISN 0767	C 72 J3= IDB(13) + 1	00024270
ISN 0768	J4= IDB(13) + 1	00024280
ISN 0769	J5= IPIC(3) + 1	00024290
		00024300
		00024310
		00024320
		00024330

ISN 0770	J6= IPIC(4)	00024340
ISN 0771	J7= IPIC(5)	00024350
ISN 0772	J8= IPIC(6)	00024360
ISN 0773	J9= IPIC(7)	00024370
ISN 0774	J10= IPIC(8)	00024380
ISN 0775	J11= IPIC(9)	00024390
ISN 0776	GO TO 79	00024400
	C	
ISN 0777	73 CONTINUE	00024410
ISN 0778	J3= IDB(13) + 1	00024420
ISN 0779	J4= IDB(13) + 1	00024430
ISN 0780	J5= IDB(14) + 1	00024440
ISN 0781	J6= IPIC(4) + 1	00024450
ISN 0782	J7= IPIC(5)	00024460
ISN 0783	J8= IPIC(6)	00024470
ISN 0784	J9= IPIC(7)	00024480
ISN 0785	J10= IPIC(8)	00024490
ISN 0786	J11= IPIC(9)	00024500
ISN 0787	GO TO 79	00024510
	C	
ISN 0788	74 J3= IDB(13) + 1	00024520
ISN 0789	J4= IDB(13) + 1	00024530
ISN 0790	J5= IDB(14) + 1	00024540
ISN 0791	J6= IDB(14) + 1	00024550
ISN 0792	J7= IPIC(5) + 1	00024560
ISN 0793	J8= IPIC(6)	00024570
ISN 0794	J9= IPIC(7)	00024580
ISN 0795	J10= IPIC(8)	00024590
ISN 0796	J11= IPIC(9)	00024600
ISN 0797	GO TO 79	00024610
	C	
ISN 0798	75 CONTINUE	00024620
ISN 0799	J3= IDB(13) + 1	00024630
ISN 0800	J4= IDB(13) + 1	00024640
ISN 0801	J5= IDB(14) + 1	00024650
ISN 0802	J6= IDB(14) + 1	00024660
ISN 0803	J7= IDB(3) + 1	00024670
ISN 0804	J8= IPIC(6) + 1	00024680
ISN 0805	J9= IPIC(7)	00024690
		00024700
		00024710
		00024720

	ISN 0806	J10= IPIC(8)	00024730
	ISN 0807	J11= IPIC(9)	00024740
	ISN 0808	GO TO 79	00024750
		C	
	ISN 0809	76 CONTINUE	00024760
	ISN 0810	J3= IDB(13) + 1	00024770
	ISN 0811	J4= IDB(13) + 1	00024780
	ISN 0812	J5= IDB(14) + 1	00024790
	ISN 0813	J6= IDB(14) + 1	00024800
	ISN 0814	J7= IDB(3) + 1	00024810
	ISN 0815	J8= IDB(1) + 1	00024820
	ISN 0816	J9= IPIC(7) + 1	00024830
	ISN 0817	J10= IPIC(8)	00024840
	ISN 0818	J11= IPIC(9)	00024850
	ISN 0819	GO TO 79	00024860
		C	
	ISN 0820	77 CONTINUE	00024870
	ISN 0821	J3= IDB(13) + 1	00024880
9-156	ISN 0822	J4= IDB(13) + 1	00024890
	ISN 0823	J5= IDB(14) + 1	00024900
	ISN 0824	J6= IDB(14) + 1	00024910
	ISN 0825	J7= IDB(3) + 1	00024920
	ISN 0826	J8= IDB(1) + 1	00024930
	ISN 0827	J9= IDB(15) + 1	00024940
	ISN 0828	J10= IPIC(8) + 1	00024950
	ISN 0829	J11= IPIC(9)	00024960
	ISN 0830	GO TO 79	00024970
		C	
	ISN 0831	78 CONTINUE	00024980
	ISN 0832	J3= IDB(13) + 1	00024990
	ISN 0833	J4= IDB(13) + 1	00025000
	ISN 0834	J5= IDB(14) + 1	00025010
	ISN 0835	J6= IDB(14) + 1	00025020
	ISN 0836	J7= IDB(3) + 1	00025030
	ISN 0837	J8= IDB(1) + 1	00025040
	ISN 0838	J9= IDB(15) + 1	00025050
	ISN 0839	J10= IDB(15) + 1	00025060
	ISN 0840	J11= IPIC(9) + 1	00025070
		C	
			00025080
			00025090
			00025100
			00025110

ISN 0841		79 CONTINUE	00025120
	C		00025130
	C	THE HARDWARE INDICES ARE SET	00025140
	C		00025150
ISN 0842		80 IF (DATAB(7,J3).LT.CDAISF.OR.DATAB(7,J4).LT.CDAISO.OR.DATAB(7,J5).	00025160
		* GT.RMAXF.OR.DATAB(7,J6).GT.RMAXD) GO TO 81	00025170
	C		00025180
	C	FUEL CIRCUIT AND OXIDIZER CIRCUIT ISOLATION VALVES AND FILTERS	00025190
	C	ARE ACCEPTABLE	00025200
	C		00025210
ISN 0844		DLPI SF = (1.29E-3/RHOF)*(WDOTF/DATAB(7,J3))**2	00025220
ISN 0845		DLPI SO = (1.29E-3/RHOO)*(WDOTO/DATAB(7,J4))**2	00025230
ISN 0846		DLPI FIF = DATAB(7,J5)*WDOTF	00025240
ISN 0847		DLPI FIO = DATAB(7,J6)*WDOTO	00025250
ISN 0848		ICHOSE(3) = DATAB(1,J3)	00025260
ISN 0849		ICHOSE(4) = DATAB(1,J4)	00025270
ISN 0850		ICHOSE(5) = DATAB(1,J5)	00025280
ISN 0851		ICHOSE(6) = DATAB(1,J6)	00025290
ISN 0852		IPIC(1) = J3	00025300
ISN 0853		IPIC(2) = J4	00025310
ISN 0854		IPIC(3) = J5	00025320
9-157 ISN 0855		IPIC(4) = J6	00025330
	C		00025340
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF PNEUMATIC REGULATOR	00025350
	C		00025360
ISN 0856		PTI = DATAB(8,J1)	00025370
ISN 0857		PFT = PTI + 2.*DLPI SF + 2.*DLPI FIF	00025380
ISN 0858		POT = PTI + 2.*DLPI SO + 2.*DLPI FIO	00025390
ISN 0859		PREG = AMAX1(PFT,POT)	00025400
ISN 0860		WDOTPR = 1.05*1.02E-7*26.*PREG*(WDOTF/RHOF + WDOTO/RHOO)	00025410
ISN 0861		CDAREG = WDOTPR/SQRT(5600.*PREG/1.27E4)	00025420
	C		00025430
ISN 0862		IF (PREG.LT.DATAB(8,J7).OR.PREG.GT.DATAB(9,J7).OR.DATAB(7,J7).LT.	00025440
		* CDAREG) GO TO 81	00025450
	C		00025460
	C	REGULATOR IS ACCEPTABLE	00025470
	C		00025480
ISN 0864		ICHOSE(7) = DATAB(1,J7)	00025490
ISN 0865		IPIC(5) = J7	00025500

	C		00025510
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF PNEUMATIC ISOLATION	00025520
	C	VALVE	00025530
	C		00025540
ISN 0866		RHOPR= 1.02E-7*3000.	00025550
ISN 0867		CDAISS= WOOTPR/SQRT(200.*RHOPR/1.29E-3)	00025560
ISN 0868		IF(DATAB(7,J8).LT.CDAISS) GO TO 81	00025570
	C		00025580
	C	PNEUMATIC ISOLATION VALVE IS ACCEPTABLE	00025590
	C		00025600
ISN 0870		ICHOSE(8)= DATAB(1,J8)	00025610
ISN 0871		IPIC(6)= J8	00025620
	C		00025630
	C	PRELIMINARY CALCULATIONS FOR SELECTION OF FUEL TANK,OXIDIZER	00025640
	C	TANK AND PNEUMATIC TANK	00025650
	C		00025660
ISN 0872		WP= 1.1*TOTIMP/260.	00025670
ISN 0873		WF= WP/(1. + XMR)	00025680
9-158 ISN 0874		VF= WF/RHDF	00025690
ISN 0875		VFT= 1.1*VF	00025700
ISN 0876		WO= WF*XMR	00025710
ISN 0877		ACSWP= WF + WO	00025720
ISN 0878		VO= WO/RHDO	00025730
ISN 0879		VOT= 1.1*VO	00025740
ISN 0880		VPRT= PFT*(VFT + VOT)/(3000. - 2.*PFT)	00025750
	C		00025760
ISN 0881		IF(DATAB(6,J9).LT.VFT.OR.DATAB(7,J9).LT.PFT.OR.DATAB(6,J10).LT. * VOT.OR.DATAB(7,J10).LT.POT.OR.DATAB(6,J11).LT.VPRT) GO TO 81	00025770
	C		00025780
	C	FUEL TANK, OXIDIZER TANK AND PNEUMATIC TANK ARE ACCEPTABLE.	00025790
	C		00025800
ISN 0883		ICHOSE(9)= DATAB(1,J9)	00025810
ISN 0884		ICHOSE(10)= DATAB(1,J10)	00025820
ISN 0885		ICHOSE(11)= DATAB(1,J11)	00025830
ISN 0886		TNKWT= DATAB(23,J9) + DATAB(23,J10)	00025840
	C		00025850
	C	SIZE PLUMBING AND CONNECTORS	00025860
	C		00025870
ISN 0887		PCWATE= .2*(DATAB(23,J9) + DATAB(23,J10) + DATAB(23,J11))	00025880
			00025890

ISN 0888		IPIC(7)= J9	00025900
ISN 0889		IPIC(8)= J10	00025910
ISN 0890		IPIC(9)= J11	00025920
ISN 0891		N(12)= KK	00025930
ISN 0892		N(13)= II	00025940
ISN 0893		N(14)= JJ	00025950
ISN 0894		N(1)= J1	00025960
ISN 0895		N(2)= J2	00025970
ISN 0896		N(3)= J3	00025980
ISN 0897		N(4)= J4	00025990
ISN 0898		N(5)= J5	00026000
ISN 0899		N(6)= J6	00026010
ISN 0900		N(7)= J7	00026020
ISN 0901		N(8)= J8	00026030
ISN 0902		N(9)= J9	00026040
ISN 0903		N(10)= J10	00026050
ISN 0904		N(11)= J11	00026060
ISN 0905		DO 802 I=1,14	00026070
ISN 0906		J= N(I)	00026080
ISN 0907		WT= WT + NCHOSE(I)*DATAB(23,J)	00026090
9-159 ISN 0908		VOL= VOL + NCHOSE(I)*DATAB(24,J)	00026100
ISN 0909		PL= PL + NCHOSE(I)*DATAB(16,J)	00026110
ISN 0910		PLMIN= PLMIN + NCHOSE(I)*DATAB(18,J)	00026120
ISN 0911	802	CONTINUE	00026130
ISN 0912		WT= WT + ACSWP + PCWATE	00026140
ISN 0913		RETURN	00026150
ISN 0914	C		00026160
	81	CONTINUE	00026170
	C		00026180
	C		00026190
	C	HARDWARE SELECTION NOT ACCEPTABLE - INCREMENT HARDWARE INDICES	00026200
ISN 0915		IF(J3.LT.J3E) GO TO 82	00026210
ISN 0917		IF(J4.LT.J4E) GO TO 83	00026220
ISN 0919		IF(J5.LT.J5E) GO TO 84	00026230
ISN 0921		IF(J6.LT.J6E) GO TO 85	00026240
ISN 0923		IF(J7.LT.J7E) GO TO 86	00026250
ISN 0925		IF(J8.LT.J8E) GO TO 87	00026260
ISN 0927		IF(J9.LT.J9E) GO TO 88	00026270
			00026280

ISN 0929		IF(J10.LT.J10E) GO TO 89	00026290
ISN 0931		IF(J11.LT.J11E) GO TO 90	00026300
	C		00026310
	C	NO ACCEPTABLE HARDWARE	00026320
	C		00026330
ISN 0933		ICHOSE(1)= -1	00026340
ISN 0934		RETURN	00026350
	C		00026360
ISN 0935	82	J3= J3 + 1	00026370
ISN 0936		GO TO 80	00026380
ISN 0937	83	J3= IDB(13) + 1	00026390
ISN 0938		J4= J4 + 1	00026400
ISN 0939		GO TO 80	00026410
ISN 0940	84	J3= IDB(13) + 1	00026420
ISN 0941		J4= IDB(13) + 1	00026430
ISN 0942		J5= J5 + 1	00026440
ISN 0943		GO TO 80	00026450
ISN 0944	85	J3= IDB(13) + 1	00026460
ISN 0945		J4= IDB(13) + 1	00026470
ISN 0946		J5= IDB(14) + 1	00026480
ISN 0947		J6= J6 + 1	00026490
ISN 0948		GO TO 80	00026500
ISN 0949	86	J3= IDB(13) + 1	00026510
ISN 0950		J4= IDB(13) + 1	00026520
ISN 0951		J5= IDB(14) + 1	00026530
ISN 0952		J6= IDB(14) + 1	00026540
ISN 0953		J7= J7 + 1	00026550
ISN 0954		GO TO 80	00026560
ISN 0955	87	J3= IDB(13) + 1	00026570
ISN 0956		J4= IDB(13) + 1	00026580
ISN 0957		J5= IDB(14) + 1	00026590
ISN 0958		J6= IDB(14) + 1	00026600
ISN 0959		J7= IDB(3) + 1	00026610
ISN 0960		J8= J8 + 1	00026620
ISN 0961		GO TO 80	00026630
ISN 0962	88	J3= IDB(13) + 1	00026640
ISN 0963		J4= IDB(13) + 1	00026650
ISN 0964		J5= IDB(14) + 1	00026660
ISN 0965		J6= IDB(14) + 1	00026670

ISN 0966		J7= IDB(3) + 1	00026680
ISN 0967		J8= IDB(1) + 1	00026690
ISN 0968		J9= J9 + 1	00026700
ISN 0969		GO TO 80	00026710
ISN 0970	89	J3= IDB(13) + 1	00026720
ISN 0971		J4= IDB(13) + 1	00026730
ISN 0972		J5= IDB(14) + 1	00026740
ISN 0973		J6= IDB(14) + 1	00026750
ISN 0974		J7= IDB(3) + 1	00026760
ISN 0975		J8= IDB(1) + 1	00026770
ISN 0976		J9= IDB(15) + 1	00026780
ISN 0977		J10= J10 + 1	00026790
ISN 0978		GO TO 80	00026800
ISN 0979	90	J3= IDB(13) + 1	00026810
ISN 0980		J4= IDB(13) + 1	00026820
ISN 0981		J5= IDB(14) + 1	00026830
ISN 0982		J6= IDB(14) + 1	00026840
ISN 0983		J7= IDB(3) + 1	00026850
ISN 0984		J8= IDB(1) + 1	00026860
ISN 0985		J9= IDB(15) + 1	00026870
ISN 0986		J10= IDB(15) + 1	00026880
ISN 0987		J11= J11 + 1	00026890
ISN 0988		GO TO 80	00026900
ISN 0989		END	00026910
			00026920

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 988 ,PROGRAM SIZE = 12634

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*



COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBCDIC,NULIST,NODECK,LOAD,NOMAP,NOEDIT,NOXREF

ISN 0002	FUNCTION GAM(X)	00000010
ISN 0003	IF (X.GT.1) GO TO 2	00000020
ISN 0005	Z=X	00000030
ISN 0006	1 IF (Z.GT.0.) GO TO 3	00000040
ISN 0008	Z=Z+1.	00000050
ISN 0009	GO TO 1	00000060
ISN 0010	2 Z=X-1.	00000070
ISN 0011	3 T1=Z+.5	00000080
ISN 0012	TZG=T1+5.	00000090
ISN 0013	T1=TZG**T1.	00000100
ISN 0014	T1=EXP(-TZG)*T1*2.50662827465	00000110
ISN 0015	GAMZ=T1*(1.+76.18009173/(Z+1.)-86.50532033/(Z+2.)+24.01409822/ 6 (Z+3.)-1.231739516/(Z+4.)+.120858003E-2/(Z+5.)-.536382E-5/(Z+6.))	00000120
ISN 0016	IF (X.GT.1) GO TO 5	00000130
ISN 0018	4 GAMZ=GAMZ/Z	00000140
ISN 0019	IF (Z.EQ.X) GO TO 5	00000150
ISN 0021	Z=Z-1.	00000160
ISN 0022	GO TO 4	00000170
ISN 0023	5 GAM=GAMZ	00000180
ISN 0024	RETURN	00000190
ISN 0025	END	00000200
		00000210

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NULIST,NODECK,LOAD,NOMAP,NOEDIT,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 24 ,PROGRAM SIZE = 602

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

125K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBDCIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

ISN	Code	Address
	C	00000220
ISN 0002	FUNCTION CERF(Y)	00000230
ISN 0003	DIMENSION B(28),A(26),AA(17),BB(19)	00000240
ISN 0004	IF(Y.GT.4.0)GO TO 2	00000250
ISN 0006	DATA AZERO / 3.88730365/	00000260
ISN 0007	DATA A(1) /-1.38163142/	00000270
ISN 0008	DATA A(2) / .647316404/	00000280
ISN 0009	DATA A(3) /-.305931024/	00000290
ISN 0010	DATA A(4) /-.1386797472/	00000300
ISN 0011	DATA A(5) /-.05924745/	00000310
ISN 0012	DATA A(6) /-.023691751/	00000320
ISN 0013	DATA A(7) /-.00884736263/	00000330
ISN 0014	DATA A(8) / .00308566171/	00000340
ISN 0015	DATA A(9) /-.001006386351/	00000350
ISN 0016	DATA A(10) /-.000307546328843/	00000360
ISN 0017	DATA A(11) /-.86261983E-04 /	00000370
ISN 0018	DATA A(12) / .23645096E-04 /	00000380
ISN 0019	DATA A(13) /-.60791002E-05 /	00000390
ISN 0020	DATA A(14) / .146597217E-05 /	00000400
ISN 0021	DATA A(15) /-.03351593E-05 /	00000410
ISN 0022	DATA A(16) / .007280579E-05 /	00000420
ISN 0023	DATA A(17) /-.001505791E-05 /	00000430
ISN 0024	DATA A(18) / .297094742E-08 /	00000440
ISN 0025	DATA A(19) /-.560212739E-09 /	00000450
ISN 0026	DATA A(20) / .101131623E-09 /	00000460
ISN 0027	DATA A(21) /-.17506504E-10 /	00000470
ISN 0028	DATA A(22) /-.029103813E-10/	00000480
ISN 0029	DATA A(23) /-.4653264E-12 /	00000490
ISN 0030	DATA A(24) / .7164815E-13 /	00000500
ISN 0031	DATA A(25) /-.1063749E-13 /	00000510
ISN 0032	DATA A(26) / .152467E-14 /	00000520
ISN 0033	DATA B(27) / .0 /	00000530
ISN 0034	DATA B(28) / .0 /	00000540
ISN 0035	DATA AAZERO / 1.970705272/	00000630
ISN 0036	DATA AA(1) /-.014339740271775/	00000640
ISN 0037	DATA AA(2) / .00029736169220261/	00000650
ISN 0038	DATA AA(3) /-.98035160E-05/	00000660

ISN 0039	DATA AA(4)	/ .04331334E-05	/		
ISN 0040	DATA AA(5)	/-.2362150E-07	/		00000670
ISN 0041	DATA AA(6)	/-.1515496E-08	/		00000680
ISN 0042	DATA AA(7)	/-.11084939E-09	/		00000690
ISN 0043	DATA AA(8)	/ .90425901E-11	/		00000700
ISN 0044	DATA AA(9)	/-.80947054E-12	/		00000710
ISN 0045	DATA AA(10)	/ .7853856E-13	/		00000720
ISN 0046	DATA AA(11)	/-.617918E-14	/		00000730
ISN 0047	DATA AA(12)	/ .90715E-15	/		00000740
ISN 0048	DATA AA(13)	/-.10646E-15	/		00000750
ISN 0049	DATA AA(14)	/ .01315E-15	/		00000760
ISN 0050	DATA AA(15)	/-.00170E-15	/		00000770
ISN 0051	DATA AA(16)	/ .00023E-15	/		00000780
ISN 0052	DATA AA(17)	/-.00003E-15	/		00000790
ISN 0053	DATA BB(18)	/ .0	/		00000800
ISN 0054	DATA BB(19)	/ .0	/		00000810
ISN 0055	X=Y/4.				00000820
ISN 0056	COEFF=4.*X*X-2.				00000821
9-164 ISN 0057	DO 1 I=1,26				00000822
ISN 0058	J=27-I				00000823
ISN 0059	1 B(J)=COEFF*B(J+1)-B(J+2)+A(J)				00000824
ISN 0060	BZERO=COEFF*B(1)-B(2)+AZERO				00000825
ISN 0061	CERF=X/2.*(BZERO-B(2))				00000826
ISN 0062	RETURN				00000827
ISN 0063	2 X=4./Y				00000828
ISN 0064	COEFF=4.*X*X-2.				00000830
ISN 0065	DO 3 I=1,17				00000840
ISN 0066	J=18-I				00000850
ISN 0067	3 BB(J)=COEFF*BB(J+1)-BB(J+2)+AA(J)				00000860
ISN 0068	BBZERO=COEFF*BB(1)-BB(2)+AAZERO				00000870
ISN 0069	CFRF=(BBZERO-BB(2))/(2.*Y*EXP(Y*Y))*564189583547756				00000880
ISN 0070	RETURN				00000890
ISN 0071	END				00000910

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,=BCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 70 ,PROGRAM SIZE = 1040

**\*STATISTICS\* NO DIAGNOSTICS GENERATED**

**\*\*\*\*\* END OF COMPILATION \*\*\*\*\***

**121K BYTES OF CORE NOT USED**

COMPILER OPTIONS - NAME= MAIN,DPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NOBACK,LOAD,NOMAP,NOEDIT,ID,NOXREF						
	C	.....				00000920
ISN 0002		SUBROUTINE RELY (IRTN,IDS,NEQUIP)				00000930
ISN 0003		COMMON /BTWN/WT,VOL,DT,P,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN,				00000940
		* D,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVWT,TKWT,PASSIR,				00000950
		* SATTWT,TPRIM,IBTLLOC,RADA,RADAE,RAT,HTRPWR,HTRPRB,				00000960
		* HPT,HTPIPE,VCHP,HTPT,FC,NZERO,COMRT,ALSSN,BITRAT(Z),				00000970
		* EQBLG,SARBLG,SATWT				00000971
ISN 0004		COMMON /USERR/KEOPT,SYSLB,RFIXED,SLBMX,ISPT,SPEC(6),CONS,ISUB				00000980
ISN 0005		COMMON /USERI/EQMLWT,EQM2WT,DIAMAX,ALT				00000990
ISN 0006		COMMON /CHUSE/ICHUSE(60),NCHUSE(60),COSTM(5,60),DATAB(6,60),				00001000
		* THM(4,60),DPIA(11,60),SKD(7,60)				00001010
ISN 0007		COMMON /PRTCUM/ACCRCY,CISTAR,IREL,MMDOLD,TRUNC,ITRUNC,DE,TE,				00001012
		* TOOLR,QCR,SEIR,PMR,PE,PU,TOULU,QCP,SEIP,PMP,SATR,SATINV;MER;				00001013
		* METNV,PAYR,PAUINV,PAYQUL,GSE,XLTOT,CTOT,FEER,FEINV,DDTE,XVEST,				00001014
		* OPS,SKTAU(6),ROLD(60),TSRTT,AN,TS,DS,AM,TF,BF,TC,TA,TB,TOTOPS				00001015
ISN 0008		COMMON /USERS/IVOLT,TBI				00001020
ISN 0009		DIMENSION N(5),NEQUIP(5)				00001030
ISN 0010		COMMON /DECOM/R(31),NR(60),R1(31,60),Z(31),RD(31),RDUM(31),SAVK(31				00001040
		*),SAVRNW(31),RNEW(31),NMX(60),SAVMX(60),COST(60),DUM(2563)				00001050
ISN 0011		REAL MMDOLD,MMDNEW,LAMS,NZERO				00001060
ISN 0012		INTEGER SAVMX,SAVNSR				00001070
	C	.....				00001080
	C					00001090
	C					00001100
	C	VARIABLES	SIZE	INITIAL ORIGIN	DEFN	00001110
	C			CHANGE		00001120
	C	NSMX	1	EXT-NC	MAX NUM SYSTEM REDUNDANCIES	00001130
	C	NSR	1	EXT- C	CURRENT NUM OF SYSTEM	00001140
	C				REDUNDANCIES	00001150
	C	IRTN	1	EXT-NC	RETURN INDICATOR	00001160
	C	JMIN	1	EXT-NC	LOWER LIMIT ON MODULE NUM	00001170
	C	JMAX	1	EXT-NC	UPPER LIMIT ON MODULE NUM	00001180
	C	NR	N(NSS)	EXT- C	CURRENT NUM OF REDUNDANCIES IN	00001190
	C				MODULE J	00001200
	C	NMX	N(NSS)	EXT-NC	MAX NUM REDUNDANCIES IN MODULE	00001210
	C				J	00001220
	C				=1. R(TRUNC) MODE	00001230

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C	NT	1	EXT-NC	LOOP AND OPTION PARAMETER	00001240
C	DELH	1	EXT-NC	TIME INCREMENT	00001250
C	ITRUNC	1	EXT-NC	NUM OF TIME POINTS	00001260
C	R	ITRUNC	INT	RELIABILITY FNC FOR MODULE J	00001270
C				=ITRUNC MMD MODE	00001280
C	ROLD	ITRUNC	EXT- C	PREVIOUS VALUE OF SYSTEM	00001290
C				RELIABILITY	00001300
C	RNEW	ITRUNC	INT	SYSTEM RELIABILITY WITH WITH A	00001310
C				REDUNDANCY ADDED	00001320
C	RI	ITRUNC	EXT- C	SYSTEM RELIABILITY MATRIX	00001330
C		*N(NSS)			00001340
C	CUST	N(NSS)	EXT-NC	VALUE OF EXPENSE OPTION FOR	00001350
C				MODULE J	00001360
C	RHO	1	INT	DECISION PARAMETER(	00001370
C				ABS(*NEW - *OLD)/EXPENSE	00001380
C	RHOTH	1	EXT-NC	LOWER BOUND FOR RHO	00001390
C	OLDRHO	1	INT	PREVIOUS VALUE OF RHO	00001400
C	MMDOLD	1	INT	PREVIOUS MMD VALUE	00001410
C	MMDNEW	1	INT	MMD VALUE WITH A REDUNDANCY	00001420
C				ADDED	00001430
C	JSAVE	1	INT	MODULE WITH LARGEST VALUE OF	00001440
C				RHO	00001450
C	SAVRNW	ITRUNC	INT	SYSTEM RELIABILITY FNC WITH A	00001460
C				REDUNDANCY IN MODULE JSAVE	00001470
C	SAVR	ITRUNC	INT	RELIABILITY FNC FOR MODULE	00001480
C				JSAVE WITH A REDUNDANCY ADDED	00001490
C	SAVMD	1	INT	MMD WITH A REDUNDANCY ADDED IN	00001500
C				MODULE JSAVE	00001510
C	SYSLB	1	EXT- C	SYSTEM WEIGHT	00001520
C	SLBMX	1	EXT-NC	MAX SYSTEM WEIGHT	00001530
C	DATAB(1,J)	N(NSS)	EXT-NC	REDUNDANCY WEIGHT FOR MODULE J	00001540
C	IND	1	INT	LOOP INDEX	00001550
C	1	1	INT	INDEX	00001560
C	RFIXED	1	EXT-NC	INITIAL RELIABILITY	00001570
C					00001580
C	SUBROUTINES CALLED(				00001590
C				QSF - INTEGRATION BY SIMPSON'S RULE (SSP)	00001600
C				RIMOD- RELIABILITY MODELS CALCULATION	00001610
C					00001620

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ISN 0013  
ISN 0014

C	.....	00001630
C	*** PROGRAM INITIALIZATIONS ***	00001640
C	.....	00001650
C	.....	00001660
C	.....	00001670
ISN 0013	DO 110 I=1,60	00001680
ISN 0014	110 NR(I)=0	00001690
C	*** USER INPUTS ***	00001700
C	.....	00001710
C	KEOPT( EXPENSE OPTION INDICATOR	00001720
C	1 WEIGHT	00001730
C	OTHERWISE COST	00001740
C	.....	00001750
C	RFIXED( INITIAL SYS RELIABILITY	00001760
C	.....	00001770
C	SYSLB( INITIAL WEIGHT (POUNDS)	00001780
C	.....	00001790
C	SLBMX( MAX SYS WEIGHT	00001800
C	.....	00001810
C	TRUNC( MISSION LENGTH (HRS)	00001820
C	.....	00001830
C	ITRUNC( NUM OF TIME POINTS	00001840
C	.....	00001850
C	ISUB( REQUIREMENTS OPTION	00001860
C	1 AT LEAST ONE SUB-SYS SPEC	00001870
C	OTHERWISE NO SUB-SYS SPEC	00001880
C	.....	00001890
C	ISPT( SINGLE POINT FAILURE REQUIREMENTS OPTION	00001900
C	0 REQ NOT IN EFFECT	00001910
C	OTHERWISE REQ IN EFFECT	00001920
C	.....	00001930
C	SPEC1( MMD SYS REQUIREMENT (HRS)	00001940
C	.....	00001950
C	SPEC(K)( R(ITRUNC) SUB-SYS REQ K=1,NSS	00001960
C	DEFAULT VALUE IS 0.0	00001970
C	.....	00001980
C	SPEC(NSS+1)( R(ITRUNC) SYS REQ DEFAULT VALUE IS 0.0	00001990
C	.....	00002000
C	N(K)( CUMULATIVE NUM OF MODULES THRU SUB-SYS K	00002010

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	C				00002020
ISN 0015		RFNL=0.7			00002021
ISN 0016		TRUNC=TPRIM*730.			00002030
ISN 0017		ALPHA=TRUNC/((1-ALUG(RFNL))**.625)			00002031
ISN 0018		SPEC1=CUNS*730.			00002040
ISN 0019		ITRUNC=31			00002050
ISN 0020		SYSLB=SAATTWT			00002051
	C		SET NUM OF SUB SYS		00002060
ISN 0021		NSS=5			00002070
	C		ACCUMULATE N		00002080
ISN 0022		N(I)=NEQUIP(I)			00002081
ISN 0023		DO 100 I=2,NSS			00002090
ISN 0024	100	N(I)=NEQUIP(I)+N(I-1)			00002100
	C		*** SIS INPUTS ***		00002110
	C				00002120
	C	ACSWP(	INITIAL EXPENDABLES WEIGHT (POUNDS)	AP	00002130
	C				00002140
	C	EMU(	EXPENDABLES INITIAL MEAN LIFETIME (HRS)	AP	00002150
	C				00002160
	C	ESIG(	EXPENDABLES INITIAL STD. DEV. (HRS)	AP	00002170
	C				00002180
	C	MAXEXP(	MAX NUM OF EXPENDABLE INCREMENTS	AP	00002190
	C				00002200
	C	NZERO(	ORBITAL MEAN MOTION (RAD/HRS)	AP	00002210
	C				00002220
	C	DC(	DUTY CYCLE	OTHER	00002230
	C				00002240
	C	TB	BATTERY TEMP (DEGREES KELVIN)	OTHER	00002250
	C				00002260
	C	DI	DEPTH OF DISCHARGE (BETWEEN 0 AND 100)	OTHER	00002270
	C				00002280
	C	NC(	TOTAL NUM OF CELLS (ALL BATTERIES)	OTHER	00002290
	C				00002300
	C	PARAMETERS NECESSARY TO COMPUTE THE CYCLES/HR FACTOR		SEC	00002310
	C		NOW FIXED AT 4.0E-11, REF MODEL 5		00002320
	C				00002330
ISN 0025		EMU=TRUNC			00002340
ISN 0026		ESIG=TRUNC/6.			00002350
ISN 0027		MAXEXP=20			00002360



ISN 0028		DC=.1			00002370
ISN 0029		TB=TBI+273.			00002375
	C				00002380
	C				00002390
	C		***	FIXED CONSTANTS	***
	C				00002400
	C				00002410
ISN 0030		LAMS=120.		SENSE/SWITCH FAILURE RATE.	00002420
	C				00002430
ISN 0031		RHO1=0.00001		PAYOFF THRESHOLD, R(TRUNC)	00002440
	C				00002450
ISN 0032		RHO2=0.1		PAYOFF THRESHOLD, MMD	00002460
	C				00002470
ISN 0033		DELMU=2190.		EXPENDABLES LIFE INCR.	00002480
	C				00002490
ISN 0034		DELSTG=365.		EXPENDABLES STD. DEV. INCR.	00002500
	C				00002510
	C				00002520
	C				00002530
	C		***	SYS PARAM SPECIFICATION	***
	C				00002540
	C				00002550
	C				00002560
	C				00002570
	C			R-SHIFT NCHOSE AND COLUMNS OF	00002580
	C			DATA BY I BEGINNING WITH THE	00002590
	C			THIRD SUB-SYS	00002600
ISN 0035		JMIN=N(2)+1			00002610
ISN 0036		JMAX=N(NSS)			00002620
	C			INITIALIZE	00002630
ISN 0037		DO 130 I=1,6			00002640
ISN 0038	130	Z(I)=DATA(I,JMIN)			00002650
ISN 0039		NZ=NCHOSE(JMIN)			00002660
ISN 0040		DO 140 J=JMIN,JMAX			00002670
	C			SHIFT NCHOSE	00002680
ISN 0041		NY=NCHOSE(J+1)			00002690
ISN 0042		NCHOSE(J+1)=NZ			00002700
ISN 0043		NZ=NY			00002710
ISN 0044		DO 140 I=1,6			00002720
	C			SHIFT DATA	00002730
ISN 0045		R(I)=DATA(I,J+1)			00002740

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ISN 0046		DATA B(I,J+1)=Z(I)		00002750
ISN 0047		Z(I)=R(I)		00002760
ISN 0048	140	CONTINUE		00002770
	C		INSERT EXPENDABLES PARAMETERS	00002780
ISN 0049		DATA B(1,JMIN)=3.*(ACSWP+TNKWT)		00002790
ISN 0050		DATA B(2,JMIN)=4.		00002800
ISN 0051		DATA B(3,JMIN)=EMU		00002810
ISN 0052		DATA B(4,JMIN)=ESIG		00002820
ISN 0053		DATA B(5,JMIN)=DELMU		00002830
ISN 0054		DATA B(6,JMIN)=DELSIG		00002840
	C		SET MAX NUM OF REDUNDANT ELE.	00002860
ISN 0055		NMX(JMIN)=MAXEXP.		00002870
ISN 0056		SAVMX(JMIN)=NMX(JMIN)		00002880
	C		RESET N(K)	00002890
ISN 0057		DO 150 K=2,NSS		00002900
ISN 0058	150	N(K)=N(K)+1		00002910
ISN 0059		JMAX=JMAX+1		00002920
	C		SWEEP DATA B AND COMPUTE MODEL	00002930
	C		PARAMETERS	00002940
ISN 0060		DO 160 J=1,JMAX		00002950
ISN 0061		MODL=INT(DATA B(2,J)+.1)		00002960
	C		CK FOR MODEL TYPE 4	00002970
ISN 0062		IF (MODL.EQ.4) GO TO 160		00002980
	C		MAX NUM OF REDUNDANCIES	00003010
ISN 0064		NMX(J)=DATA B(6,J)+.1		00003020
ISN 0065		NMX(J)=NMX(J)-NCHOSE(J)		00003030
ISN 0066		SAVMX(J)=NMX(J)		00003040
ISN 0067		GO TO (151,152,153,160,155), MODL		00003050
	C		MODEL 1	00003060
ISN 0068	151	DATA B(4,J)=LAMS*1.0E-09		00003070
ISN 0069		DATA B(3,J)=DATA B(3,J)*1.0E-09		00003080
ISN 0070		DATA B(6,J)=DC		00003090
ISN 0071		GO TO 160		00003100
	C		MODEL 2	00003110
ISN 0072	152	DATA B(3,J)=DATA B(3,J)*1.0E-09		00003120
ISN 0073		DATA B(4,J)=DATA B(4,J)*1.0E-09		00003130
ISN 0074		GO TO 160		00003140
	C		MODEL 3	00003150
ISN 0075	153	DATA B(6,J)=NC/NCHOSF(J)		00003160

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ISN 0076		TWOPI=6.2831853		00003170
ISN 0077		DATAB(5,J)=NZERO*3600./TWOPI		00003180
ISN 0078		DATAB(4,J)=EXP(-138.10332 + 0.95927099*TB - 0.18704227*D - 0.001600003190 1717786*TB*TB - 0.0019619976*D*D + 0.0011242688*TB*D)		00003200
ISN 0079		DATAB(3,J)=EXP(-11.380958 + 0.23896921*TB - 0.04986583*D - 0.000500003210 10646174*TB*TB + 0.01930773*D*D - 0.0002374105*D**3)		00003220
ISN 0080		GO TO 160		00003230
ISN 0081	C		MODEL 5	00003240
ISN 0082	155	DATAB(c,J)=DC		00003250
ISN 0083		DATAB(3,J)=DATAB(3,J)*FC		00003260
ISN 0084	160	DATAB(4,J)=LAMS*1.0E-09		00003270
	C	CONTINUE		00003280
ISN 0085	C	DELH=TRUNC/FLOAT(ITRUNC-1)	TIME STEP INCR.	00003290
	C		CALCULATE RELIABILITY MATRIX	00003300
ISN 0086		LIM=N(NSS)		00003310
ISN 0087		DO 180 J=1,LIM		00003330
ISN 0088		IADD=0		00003331
ISN 0089		CALL RIMOD(J,DELH,ITRUNC,ITRUNC,IADD,0)		00003340
ISN 0090		DO 170 I=1,ITRUNC		00003350
ISN 0091	170	RI(I,J)=R(I)		00003360
ISN 0092	180	CONTINUE		00003370
	C		SET EXPENSE OPTION	00003380
ISN 0093		IF (KEOPT.NE.1) GO TO 185		00003390
ISN 0095		DO 190 J=1,LIM		00003400
ISN 0096	190	COST(J)=DATAB(1,J)		00003410
ISN 0097		GO TO 200		00003420
	C		COMPUTE COST	00003430
ISN 0098	195	DO 196 J=1,LIM		00003440
ISN 0099	196	COST(J)=COSTM(1,J)+COSTM(2,J)+COSTM(3,J)		00003450
	C			00003460
	C			00003470
	C			00003480
	C	*** MAIN PROGRAM ***		00003490
	C			00003500
	C			00003510
	C			00003520
	C	R(TRUNC) MODL		00003530
ISN 0100	200	LIM=NSS+1		00003540

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	C		R(ITRUC) MODE FOR EACH SUB-SYS	00003550
	C		WITH A USER SPEC.	00003560
	C		FOR K=LIM SUB-SYS IS TOTAL SYS	00003570
ISN 0101		SAVNSR=0		00003580
ISN 0102		JMAX=0		00003590
ISN 0103		DO 270 K=1,LIM		00003600
	C		CK FOR ANY SUB-SYS USER SPEC.	00003610
	C		ISUB=2 NO SUB-SYS SPECS.	00003620
	C		ISUB=1 AT LEAST ONE	00003630
	C		SUB-SYS SPEC.	00003640
ISN 0104		IF (ISUB .NE. 1 .AND. K .NE. LIM) GO TO 270		00003650
	C		SET NUM OF SUB-SYSTEM RED TO	00003660
ISN 0106		NSR=0		00003670
	C		SELECT JMIN AND JMAX	00003680
ISN 0107		IF (K.NE.LIM) GO TO 210		00003690
ISN 0109		JMIN=1		00003700
ISN 0110		JMAX=N(NSS)		00003710
ISN 0111		NSR=SAVNSR		00003720
ISN 0112		GO TO 220		00003730
ISN 0113	210	JMIN=JMAX+1		00003740
ISN 0114		JMAX=N(K)		00003750
	C		CALCULATE MAX NUM SYS RED.	00003760
ISN 0115	220	NSMX=0		00003770
ISN 0116		DO 230 L=JMIN,JMAX		00003780
ISN 0117	230	NSMX=NSMX+SAVMX(L)		00003790
	C		CK FOR SUB-SYS USER SPEC	00003800
ISN 0118		IF (SPEC(K).LE.RHO1) GO TO 269		00003810
	C		SET PARAMETERS FOR REDAP ENTRY	00003812
ISN 0120		RHOTH=RHO1		00003813
ISN 0121		NT=1		00003814
ISN 0122		IRTN=1		00003815
	C		CALCULATE INITIAL SUB-SYS	00003820
	C		RELIABILITY	00003830
ISN 0123	250	ROLD(ITRUNC)=RFIXED*RFNL		00003840
ISN 0124		DO 240 J=JMIN,JMAX		00003850
ISN 0125	240	ROLD(ITRUNC)=ROLD(ITRUNC)*RI(ITRUNC,J)		00003860
	C		CK RELIABILITY AGAINST SPEC.	00003920
	C		ENTER REDAP	00003930

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	C	ISN 0126	OLDRHO=-1.0		00003940
		ISN 0127	IF (ROLD(ITRUNC).LT.SPEC(K)) GO TO 390		00003950
	C			UPDATE NMX FOR K .LT. LIM	00003960
	C	ISN 0129	IF (K.EQ.LIM) GO TO 269		00003970
		ISN 0131	DO 260 J=JMIN,JMAX		00003980
		ISN 0132	260 NMX(J)=NR(J)		00003990
		ISN 0133	269 SAVNSR=SAVNSR+NSR		00004000
		ISN 0134	270 CONTINUE		00004010
	C				00004020
	C				00004030
	C			LIST OF EXIT PARAM AND VALUES	00004040
	C			EXIT R (TRUNC) MODE	00004050
	C			JMIN=1	00004060
	C			JMAX=N(NSS)	00004070
	C			NSR= NUM SYS RED	00004080
	C			NSMX= MAX NUM SYS RED	00004090
	C			NOW ENTER MMD DETERMINATION	00004100
	C			RESET NMX TO TRUE LIMITS	00004110
PLI-6		ISN 0135	DO 280 J=1,JMAX		00004120
		ISN 0136	280 NMX(J)=SAVMX(J)		00004130
	C				00004140
	C		200 ENTRY TO MMD DETERMINATION		00004150
	C				00004160
	C			CK FOR SINGLE POINT FAILURE	00004170
	C			REQUIREMENT(	00004180
	C			1SPT=0 NO REQ.	00004190
	C			=1 REQ.	00004200
	C	ISN 0137	IF (1SPT.EQ.0) GO TO 300		00004210
	C			SINGLE POINT FAILURE REQ. IN	00004220
	C			EFFECT	00004230
		ISN 0139	DO 290 J=1,JMAX		00004240
		ISN 0140	IF ((NMX(J).LE.0).OR.(NR(J).GT.0)) GO TO 290		00004250
		ISN 0142	MODL=DATA8(2,J)+.1		00004260
		ISN 0143	L=1		00004261
		ISN 0144	IF (MODL.EQ.5) L=NCHDSE(J)		00004262
		ISN 0146	NSR=NSR+L		00004263
		ISN 0147	NR(J)=NR(J)+L		00004264
		ISN 0148	IADD=0		00004265

ISN 0149		CALL RIMOD(J,DELH,ITRUNC,ITRUNC,IADD,0)	00004266
ISN 0150		DO 285 I=1,ITRUNC	00004267
ISN 0151	285	RI(I,J)=R(I)	00004268
ISN 0152	290	CONTINUE	00004280
	C		INITIALIZATION OF PARAMETERS
	C		BEFORE ENTRY TO THE REDUNDANCY
	C		ALLOCATION PROCEDURE
ISN 0153	300	RHOTH=RHO2	00004281
ISN 0154		NT=ITRUNC	00004284
ISN 0155		IRTN=2	00004285
	C		00004286
	C		COMPUTE INITIAL RELIABILITY
	C		FNC FOR SINGLE AND DOUBLE
	C		STRING SYSTEMS
ISN 0156	330	DO 320 I=1,ITRUNC	00004310
ISN 0157		ROLD(I)=RI(I,1)*EXP(-((DELH*FLOAT(I-1))/ALPHA)**1.6)	00004320
ISN 0158		DO 310 J=2,JMAX	00004330
ISN 0159	310	ROLD(I)=ROLD(I)*RI(I,J)	00004340
ISN 0160		RD(I)=1.-(1.-ROLD(I))**2	00004350
ISN 0161	320	CONTINUE	00004360
	C		00004370
	C		COMPUTE INITIAL MMD VALUE
ISN 0162		CALL QSF (DELH,ROLD,Z,ITRUNC)	00004380
ISN 0163		MMDOLD=RFIXED*Z(ITRUNC)	00004390
ISN 0164		CALL QSF (DELH,RD,Z,ITRUNC)	00004400
ISN 0165		DSMMD=RFIXED*Z(ITRUNC)	00004410
	C		00004420
	C		00004490
	C		CK MMDOLD AGAINST USER SPEC1
	C		GO TO REDAP
	C		ALSO RETURN POINT FOR REDAP
ISN 0166		OLDRHO=-1.0	00004520
ISN 0167		IF(IDS.EQ.0) GO TO 350	00004530
ISN 0169		IF(DSMMD.LT.SPEC1) GO TO 390	00004540
ISN 0171		GO TO 351	00004550
ISN 0172	350	IF (MMDOLD.LT.SPEC1) GO TO 390	00004560
ISN 0174	351	IRTN=0	00004570
	C		00004580
	C		COMPRESS NCHOSE AND ADD RED.
ISN 0175	360	JMIN=N(2)-1	00004590
ISN 0176		DO 370 J=1,JMIN	00004600
ISN 0177	370	NCHOSE(J)=NCHOSE(J)+NR(J)	00004610
ISN 0178		JMIN=N(2)	00004620
			00004630

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ISN 0179		JMAX=N(NSS)		00004640
ISN 0180		DO 380 J=JMIN,JMAX		00004650
ISN 0181	380	NCHOSE(J)=NCHOSE(J+1)+NR(J+1)		00004660
	C		EXPENDABLES INFO RETURN	00004670
ISN 0182		T PRIM=I PRIM+FLOAT(3*NR(JMIN))		00004680
ISN 0183		I TRUNC=I TRUNC		00004690
ISN 0184		RETURN		00004700
	C		.....	00004710
	C			00004720
	C	*** MAIN REDUNDANCY ALLOCATION PROCEDURE ***		00004730
	C	(REDAP)		00004740
	C		.....	00004750
	C			00004760
	C		IF MAX NUM RED EXCEEDED, RETRN	00004770
	C		OTHERWISE CONTINUE PROCEDURE	00004780
ISN 0185	390	IF (NSR.GE.NSMX) GO TO (490,510), IRTN		00004790
	C			00004800
	C			00004810
	C		SELECT MODULE TO ADD A RED, IF	00004820
	C		J.GF.JMAX GO TO SYS UPDATE	00004830
	C		PROCEDURE.	00004840
ISN 0187		DO 440 J=JMIN,JMAX,1		00004850
ISN 0188		IF (NR(J).GE.NMX(J)) GO TO 440		00004860
ISN 0190		MODL=DATAB(2,J)+.1		00004870
ISN 0191		IF ((MODL.EQ.3).AND.(NR(J+1).GE.NMX(J+1))) GO TO 440		00004880
	C		ADD A RED TO MODULE AND	00004890
	C		COMPUTE THE RELIABILITY FNC	00004900
ISN 0193		IADD=1		00004901
ISN 0194		CALL RIMOD(J,DELH,I TRUNC,NT,IADD,1)		00004910
	C		CALCULATE NEW SYS RELIABILITY	00004920
ISN 0195		DO 400 IND=1,NT		00004930
ISN 0196		I=I TRUNC+1-IND		00004940
ISN 0197		RNEW(I)=ROLD(I)*R(I)/RI(I,J)		00004950
ISN 0198	400	CONTINUE		00004960
	C		CK FOR R(I TRUNC) OR MMD	00004970
	C		COMPUTATIONAL MODE	00004980
ISN 0199		IF (NT.NE.1) GO TO 410		00004990
	C		R(I TRUNC) MODE	00005000
ISN 0201		I=I TRUNC		00005010

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ISN 0202		RHO=(ABS(RNEW(I)-ROLD(I)))/COST(J)		00005020
ISN 0203		GO TO 420		00005030
	C		MMD MODE	00005040
ISN 0204	410	CALL QSF (DFLH,RNEW,Z,ITRUNC)		00005050
ISN 0205		MMDNEW=Z(ITRUNC)*RFIXED		00005060
ISN 0206		RHO=(ABS(MMDNEW-MMDOLD))/CUST(J)		00005070
	C		SELECTION, DECISION SEQUENCE	00005080
	C			00005090
ISN 0207	420	IF (RHO.LT.OLDRHO) GO TO 440		00005100
	C		RHO.LT.OLDRHO( SAVE CURRENT	00005110
	C		RELIABILITY DATA, MODULE NUM,	00005120
	C		AND VALUE OF RHO.	00005130
ISN 0209		JSAVE=J		00005140
ISN 0210		OLDRHO=RHO		00005150
ISN 0211		DO 430 IND=1,NT		00005160
ISN 0212		I=ITRUNC+1-IND		00005170
ISN 0213		SAVR(I)=R(I)		00005190
ISN 0214	430	CONTINUE		00005200
ISN 0215		IF (NT.NE.1) SAVMMD=MMDNEW		00005210
ISN 0217	440	CONTINUE		00005220
ISN 0218		IF (OLDRHO.LT.RHOTH) GO TO (530,540), IRTM		00005230
	C			00005240
	C	*** END REDAP ***		00005250
	C			00005260
	C	.....		00005270
	C			00005280
	C	*** SYSTEM RELIABILITY UPDATE PROCEDURE ***		00005290
	C	(SYRUP)		00005300
	C			00005310
	C			00005320
ISN 0220		MODL=DATAB(2,JSAVE)+.1		00005330
ISN 0221		L=1		00005340
ISN 0222		IF (MODL.EQ.5) L=NCHOSE(JSAVE)		00005350
ISN 0224		NSR=NSR+L		00005360
ISN 0225		NR(JSAVE)=NR(JSAVE)+L		00005370
ISN 0226		IF(MODL.NE.4) GO TO 449		00005380
ISN 0228		SYSLB=SYSLB+DATAB(1,JSAVE)/(TPRIM+FLOAT(3*NR(JSAVE)))		00005390
ISN 0229		GO TO 450		00005400
ISN 0230	449	SYSLB=SYSLB+DATAB(1,JSAVE)*FLOAT(L)		00005410

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ISN 0231		IF (MODL.NE.3) GO TO 450		00005420
ISN 0233		NSR=NSR+1		00005430
ISN 0234		NR(JSAVE+1)=NR(JSAVE+1)+1		00005440
ISN 0235		SYSLR=SYSLB+DATAB(1,JSAVE+1)		00005450
ISN 0236		IADD=0		00005457
ISN 0237		CALL RIMOD(JSAVE+1,DELH,ITRUNC,ITRUNC,IADD,0)		00005458
ISN 0238		DO 452 I=1,ITRUNC		00005459
ISN 0239	452	RI(I,JSAVE+1)=R(I)		00005460
ISN 0240	450	IF (NT.NE.1) GO TO 455		00005461
ISN 0242		IADD=0		00005462
ISN 0243		CALL RIMOD(JSAVE,DELH,ITRUNC,ITRUNC,IADD,0)		00005463
ISN 0244		DO 451 I=1,ITRUNC		00005464
ISN 0245	451	SAVR(I)=R(I)		00005465
ISN 0246	455	DO 460 I=1,ITRUNC		00005470
ISN 0247		RI(I,JSAVE)=SAVR(I)		00005480
ISN 0248	460	CONTINUE		00005500
ISN 0249		IF (NT.NE.1) GO TO 480		00005510
ISN 0251		MMDOLD=SAVMMD		00005520
ISN 0252		IF (IDS.EQ.0) GO TO 480		00005530
ISN 0254		DO 470 IND=1,ITRUNC		00005540
ISN 0255		RD(IND)=1.-(1.-ROLD(IND))**2		00005550
ISN 0256	470	CONTINUE		00005560
ISN 0257		CALL OSF (DELH,RD,2,ITRUNC)		00005570
ISN 0258		DSMMD=FIXED*Z(ITRUNC)		00005580
ISN 0259	C		EXIT IF SYS WEIGHT EXCEEDED.	00005590
	480	IF (SYSLB.GE.SLEMX) GO TO (500,520), IRTN		00005600
	C			00005610
	C		BRANCH TO START ANOTHER PASS	00005620
	C		THRU REDAP(	00005630
	C		MODE .NT STMT NUM	00005640
	C		R(ITRUNC) I 250	00005650
	C		MMD ITRUNC 330	00005660
ISN 0261		IF (NT.NE.1) GO TO 330		00005670
ISN 0263		GO TO 250		00005680
	C			00005690
	C	*** END SYRUP ***		00005700
	C			00005710
	C			00005720
	C			00005730

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	C	*** PROGRAM RETURNS ***	
	C		00005740
	C		00005750
	C		00005760
ISN 0264	490	IRTN=-1	00005770
ISN 0265		GO TO 360	00005780
ISN 0266	500	IRTN=-2	00005790
ISN 0267		GO TO 360	00005800
ISN 0268	510	IRTN=-3	00005810
ISN 0269		GO TO 360	00005820
ISN 0270	520	IRTN=-4	00005830
ISN 0271		GO TO 360	00005840
ISN 0272	530	IRTN=-5	00005850
ISN 0273		GO TO 360	00005860
ISN 0274	540	IRTN=-6	00005870
ISN 0275		GO TO 360	00005880
	C		00005890
ISN 0276		END	00005900

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 275 ,PROGRAM SIZE = 5734

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

73K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,FBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

	C	.....	00005910
ISN 0002		SUBROUTINE RIMOD(J,DELH,ITRUNC,NT,IADD,IOPT)	00005920
ISN 0003		COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COSTM(5,60),SYSPAR(6,60),	00005930
		* THM(4,60),DPIA(11,60),SKD(7,60)	00005940
ISN 0004		COMMON /DBCOM/R(31),NR(60),R1(31,60),W(31),RD(31),RDUM(31),SAVR(31	00005950
		*),SAVRNW(31),RNEW(31),NMX(60),SAVMX(60),COST(60),DUM(2563)	00005960
ISN 0005		COMMON /PRTCUM/ACCRLY,CISTAR,IRLL,MMDOLD,TRUNC,ITRUNC,DE,TE,	00005962
		* TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMP,SATR,SATINV,MER,	00005963
		* MEINV,PAYR,PAUINV,PAYQUL,6SE,XLTOT,CTOT,FEER,FEEINV,DDTE,XVEST,	00005964
		* OPS,SKTAU(6),ROLD(60),TSRTI,AN,TS,DS,AM,TF,BF,TC,TA,TB,TOTOPS	00005965
ISN 0006		REAL LAN,LAMBAR,LAMS	00005970
	C	.....	00005980
	C	.....	00005990
	C	.....	00006000
	C	SUBROUTINE RIMOD	00006010
	C	.....	00006020
	C	PURPOSE	00006030
	C	TO COMPUTE THE RELIABILITY FUNCTION FOR MODULE J AFTER	00006040
	C	REDUNDANCIES ARE ADDED TO THE MODULE.	00006050
	C	.....	00006060
	C	USAGE	00006070
	C	CALL RIMOD(R,NR,J,DELH,ITRUNC,NT,IADD,IOPT)	00006080
	C	.....	00006090
	C	DESCRIPTION OF PARAMETERS	00006100
	C	J - INPUT MODULE NUM	00006110
	C	DELH - DELTA TIME, THE TIME INCREMENT	00006120
	C	ITRUNC - THE NUM OF TIME POINTS	00006130
	C	NT - INPUT OPTION PARAMETER	00006140
	C	IADD - INPUT OPTION PARAMETER	00006150
	C	IOPT - INPUT OPTION PARAMETER	00006160
	C	.....	00006170
	C	REMARKS	00006180
	C	OPTION PARAMETER VALUE ACTION	00006190
	C	NT 1 ONLY COMPUTE RELIABILITY AT	00006200
	C	TRUNCATION TIME. RETURN VALUE IN	00006210
	C	R(ITRUNC).	00006220
	C	ITRUNC COMPUTE RELIABILITY AT EACH TIME	00006230

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C				RETURN VALUES IN R.	00006240
C	IADD	0		ADD NO REDUNDANCIES BEFORE COM-	00006250
C				PUTING THE RELIABILITY FUNCTION.	00006260
C		1		ADD REDUNDANCIES BEFORE COMPUT-	00006270
C				ING THE RELIABILITY FUNCTION.	00006280
C	IOPT	0		UNCOUPLE MODELS 1 AND 3.	00006290
C					00006300
C			OTHER	COUPLE MODELS 1 AND 3.	00006310
C					00006320
C	GLOBAL VARIABLES PASSED THROUGH COMMON				00006330
C	R			-THE RESULTING RELIABILITY FUNCTION	00006340
C	NR			-INPUT VECTOR OF THE NUM OF REDUNDANCIES BY MODULE	00006350
C	NCHDS			-INITIAL NUM OF ELEMENTS IN MODULES	00006360
C	SYPAR			-MATRIX OF MODEL PARAMETERS	00006370
C				SYPAR(2,J)= MODEL ID FOR J-TH MODULE	00006380
C				FOR FURTHER DESCRIPTION SEE COMMENTS PRECEEDING THE	00006390
C				PARTICULAR MODEL OF INTEREST.	00006400
C					00006410
C	SUBROUTINES AND SUBPROGRAMS REQUIRED				00006420
C				FORTRAN SYS FNCS EXP, FLOAT, INT, SQRT	00006430
C				EXTERNAL FNCS GAM=GAMMA FNC, CERF=ERRDR FNC	00006440
C				SUBROUTINES NONE	00006450
C					00006460
C				.....	00006470
C					00006480
ISN 0007				ROOT2=SQR1(2.0)	00006490
ISN 0008				MOD=INT(SYPAR(2,J)+.1)	00006500
ISN 0009				GO TO (10,90,120,100,10), MOD	00006510
C				.....	00006520
C				MODELS 1 AND 5	00006530
C					00006540
C	VARIABLES	SIZE	ORIGIN	DEFN	00006550
C					00006560
C	LAMS	1	INT	SENSE/SWITCH FAILURE RATE	00006570
C	LAM	1	INT	FAILURE RATE	00006580
C	Q	1	INT	DORMANCY FACTOR	00006590
C	DC	1	INT	MODULE DUTY CYCLE	00006600
C	MI	1	INT	NUM OF STANDBY ELEMENTS	00006610
C	NI	1	INT	NUM OF ACTIVE ELEMENTS	00006620

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ISN 0033		LIM=NREQ		00006970
ISN 0034		LIM2=LIM-1		00006980
ISN 0035		DO 80 IND=1,NT		00006990
	C		DO FOR EACH TIME POINT, IN	00007000
	C		DESCENDING ORDER, NT TO 1	00007010
ISN 0036		I=ITRUNC+1-INL		00007020
ISN 0037		TIME=DELH*FLOAT(I-1)		00007030
	C		SUM0 ACCUMULATES RELIABILITY	00007040
ISN 0038		SUM0=1.0		00007050
	C		EXPONENTIAL CONSTANT	00007060
	C			00007070
ISN 0039		ECI=EXP(-LAMBAR*TIME*FLOAT(NI))		00007080
	C			00007090
	C		CALCULATE PROBABILITIES, IN	00007100
	C		DESCENDING ORDER, LIM-1 TO 0.	00007110
ISN 0040		DO 70 IND2=1,LIM		00007120
ISN 0041		K=LIM-IND2		00007130
ISN 0042		SUM2=0.0		00007140
ISN 0043		SUM1=0.0		00007150
	C		COMPUTE FIRST SUMMATION	00007160
ISN 0044		KLIM=K+1		00007170
ISN 0045		NILIM=NI+1		00007171
ISN 0046		DO 40 INDD=KLIM,NILIM		00007172
ISN 0047		IND3=INDD-1		00007173
ISN 0048		ARG1=1.+FLOAT(IND3-K)		00007180
ISN 0049		ARG2=FLOAT(NI-IND3)		00007190
ISN 0050		ARG3=1.+ARG2/QBAR		00007200
ISN 0051		BK=GAM(ARG1)*GAM(ARG2+1.)*GAM(ARG3+FLOAT(MI))/GAM(ARG3)		00007210
ISN 0052		IF ((IND3-2*(IND3/2)).EQ.1) BK=-BK		00007220
ISN 0054		Z=EXP(-LAMBAR*TIME*FLOAT(IND3))		00007230
ISN 0055	40	SUM1=SUM1+Z/BK		00007240
	C		COMPUTE SECOND SUMMATION	00007250
ISN 0056		IF (MI.EQ.0) GO TO 60		00007260
ISN 0058		DO 50 IND3=1,MI		00007270
ISN 0059		ARG1=FLOAT(IND3)		00007280
ISN 0060		ARG2=1.+FLOAT(MI-IND3)		00007290
ISN 0061		ARG3=1.+ARG1*QBAR		00007300
ISN 0062		CJ=GAM(ARG1+1.)*GAM(ARG2)*GAM(ARG3+FLOAT(NI-K))/GAM(ARG3)		00007310
ISN 0063		ICK=NI+IND3		00007320

ISN 0064		IF ((ICK-2*(ICK/2)).EQ.1) CJ=-CJ		00007330		
ISN 0066		Z=EXP(-Q*LAM*TIME*ARG1)		00007340		
ISN 0067	50	SUM2=SUM2+Z/CJ		00007350		
	C			00007360		
	C			00007370		
	C		CALCULATION OF PROBABILITY( PR(K)=A(K)*SUMS	00007380		
ISN 0068	60	SUM2=SUM1+EC1*SUM2		00007390		
ISN 0069		ARG1=FLOAT(N1)		00007400		
ISN 0070		ARG2=I.+FLOAT(K)		00007410		
ISN 0071		ARG3=1.+ARG1/UBAR		00007420		
ISN 0072		AK=GAM(ARG1+1.)*GAM(ARG3+FLOAT(MI))/(GAM(ARG2)*GAM(ARG3))		00007430		
ISN 0073		IF ((K-2*(K/2)).EQ.1) AK=-AK		00007440		
	C			00007450		
	C			00007460		
	C		ACCUMULATE RELIABILITY	00007470		
ISN 0075		SUM0=SUM0-AK*SUM2		00007480		
ISN 0076	70	CONTINUE		00007490		
	C			00007500		
	C			00007510		
	C		CK COUPLING OPTION	00007520		
	C		ASSIGN RELIABILITY AND INCR TIME	00007530		
ISN 0077		IF (MOD.EQ.3) SUM0=SUM0*R(1)		00007540		
ISN 0079	80	R(1)=SUM0		00007550		
	C			00007560		
ISN 0080		IF (MOD.EQ.3) J=J-1	CK COUPLING OPTION	00007570		
ISN 0082		RETURN		00007580		
	C			00007590		
	C			00007600		
	C			00007610		
	C			00007620		
	C	MODEL2(		00007630		
	C	VARIABLES	SIZE	ORIGIN	DEFN	00007640
	C					00007650
	C	FMU	SC	LOCAL	MEAN UNIT LIFE	00007660
	C	FSIG	SC	LOCAL	STD. DEV.	00007670
	C	SYSPAR	I,J	GLOBAL	MODEL PARAMETERS FOR J-TH	00007680
	C				MODULE	00007690
	C				I=3 VALUE OF FMU	00007700
	C				I=4 VALUE OF FSIG	00007710

	C	NI	SC	LOCAL	TOTAL NUM OF ELEMENTS	
	C					00007720
	C					00007730
	C	.....				00007740
ISN 0083	C					00007750
ISN 0084	90	FMU=SYSPAR(3,J)				00007760
		FSIG=SYSPAR(4,J)				00007770
	C				INCR REDUND.	00007780
ISN 0085		LIM=NR(J)+IADD				00007790
ISN 0086		NI=LIM+NCHDSE(J)				00007800
ISN 0087		LIM2=LIM-1				00007810
	C				COMPUTE NEW RELIABILITIES	00007820
	C					00007830
ISN 0088		DO 110 I=1,NT				00007840
ISN 0089		K=ITRUNC+1-I				00007850
ISN 0090		Z=((DELH*(K-1))-FMU)/(ROOTZ*FSIG)				00007860
ISN 0091		AN=CLRF(ABS(Z))				00007870
ISN 0092		IF (ABS(Z).GT.4.0) AN=1.-AN				00007880
ISN 0094		AN=0.5*(1.-AN)				00007890
ISN 0095		IF (Z.LT.0.0) AN=1.-AN				00007900
	C					00007910
	C				COMPUTATION OF CUMULATIVE	00007920
	C				BINOMIAL PROBABILITIES	00007930
	C					00007940
ISN 0097		Z=AN				00007950
ISN 0098		AN=AN**NI				00007960
ISN 0099		SUM=AN				00007970
ISN 0100		IF (LIM.EQ.0) GO TO 110				00007980
ISN 0102		Z=(1.-Z)/Z				00007990
ISN 0103		LLLIM=LIM2+1				00007999
ISN 0104		DO 100 LLL=1,LLLIM				00008000
ISN 0105		L=LLL-1				00008001
ISN 0106		AN=AN*(FLOAT(NI-L)/FLOAT(L+1))*Z				00008010
ISN 0107	100	SUM=SUM+AN				00008020
ISN 0108	110	R(K)=SUM				00008030
ISN 0109		RETURN				00008040
	C					00008050
	C	.....				00008060
	C					00008070
	C	MODEL3(				00008080

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	C	VARIABLES	SIZE	ORIGIN	DEFN	
	C					00008090
	C					00008100
	C	AB	SC	LOCAL	BATTERY CELL CONSTANT	00008110
	C	BB	SC	LOCAL	BATTERY CELL CONSTANT	00008120
	C	BCYC	SC	LOCAL	CYCLE RATE OF BATTERY	00008130
	C	NI	SC	LOCAL	TOTAL NUM OF BATTERIES	00008140
	C	NC	SC	LOCAL	NUM OF CELLS IN BATTERY	00008150
	C	SYSPAR	1,J	GLOBAL	MODEL PARAMETERS FOR J-TH	00008160
	C				MODULE	00008170
	C				I=3 VALUE OF AB	00008180
	C				I=4 VALUE OF BB	00008190
	C				I=5 VALUE OF BCYC	00008200
	C				I=6 VALUE OF NC	00008210
	C					00008220
	C					00008230
	C					00008240
ISN 0110	120	AB=SYSPAR(3,J)				00008250
ISN 0111		BB=SYSPAR(4,J)				00008260
ISN 0112		BCYC=SYSPAR(5,J)				00008270
ISN 0113		NC=SYSPAR(6,J)+.1				00008280
	C				INCR REDUND.	00008290
ISN 0114		LIM=NR(J)+IADD				00008300
ISN 0115		NI=LIM+NCHOSE(J)				00008310
ISN 0116		LIM2=LIM-1				00008320
ISN 0117		LIM3=NC/2				00008321
ISN 0118		NC=NC+LIM3				00008322
	C				COMPUTE NEW RELIABILITIES	00008330
	C					00008340
ISN 0119		DO 140 I=1,NT				00008350
ISN 0120		K=ITRUNC+1-I				00008360
ISN 0121		Z=(DELH*(K-1)-43800.)/(8760.*ROOTZ)				00008370
ISN 0122		AN=CERF(ABS(Z))				00008380
ISN 0123		IF (ABS(Z).GT.4.0) AN=1.-AN				00008390
ISN 0125		AN=0.5*(1.-AN)				00008400
ISN 0126		IF (Z.LT.0.0) AN=1.-AN				00008410
ISN 0128		Z=EXP(-((BCYC*(DELH*(K-1)))/AB)**BB)				00008420
ISN 0129		LLLIM=LIM3				00008430
ISN 0130		AA=Z**NC				00008432
ISN 0131		SUM=AA				00008433

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ISN 0132		Z=(1.-Z)/Z				00008434
ISN 0133		DO 125 LLL=1,LLLIM				00008435
ISN 0134		L=LLL-1				00008436
ISN 0135		AA=AA*(FLOAT(NC-L)/FLOAT(L+1))*Z				00008437
ISN 0136	125	SUM=SUM+AA				00008438
ISN 0137		Z=SUM*AN				00008439
	C					00008440
	C					00008450
	C				COMPUTATION OF CUMULATIVE BINOMIAL PROBABILITIES	00008460
ISN 0138		AN=Z**NI				00008470
ISN 0139		SUM=AN				00008480
ISN 0140		IF (LIM.EQ.0) GO TO 140				00008490
ISN 0142		Z=(1.-Z)/Z				00008500
ISN 0143		LLLIM=LIM2+1				00008509
ISN 0144		DO 130 LLL=1,LLLIM				00008510
ISN 0145		L=LLL-1				00008511
ISN 0146		AN=AN*(FLOAT(N1-L)/FLOAT(L+1))*Z				00008520
ISN 0147	130	SUM=SUM+AN				00008530
ISN 0148	140	R(K)=SUM				00008540
	C				CK COUPLING OPTION	00008550
ISN 0149		IF (IDPT.EQ.0) GO TO 150				00008560
ISN 0151		J=J+1				00008570
ISN 0152		GO TO 10				00008580
ISN 0153	150	RETURN				00008590
	C					00008600
	C					00008610
	C					00008620
	C	MODEL4 (				00008630
	C	VARIABLES	SIZE	ORIGIN	DEFN	00008640
	C					00008650
	C	FMU	SC	LOCAL	MEAN EXPENABLE DEPLETION TIME	00008660
	C	FSIG	SC	LOCAL	STD. DEV. OF DEPLETION TIME	00008670
	C	SYSPAR	I,J	GLOBAL	MODEL PARAMETERS FOR J-TH	00008680
	C				MODULE	00008690
	C				I=3 INITIAL VALUE OF MU	00008700
	C				I=4 INITIAL VALUE OF SIG	00008710
	C				I=5 INCR. VALUE OF MU	00008720
	C				I=6 INCR. VALUE OF SIG	00008730
	C					00008740

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C .....00008750
C .....00008760
C .....00008770
C .....00008780
ISN 0154 160 Z=FLOAT(NR(J)+IADD)
ISN 0155 FMU=SYSPAR(3,J)+Z*SYSPAR(5,J)
ISN 0156 FSIG=SQRT((SYSPAR(4,J)**2)+Z*(SYSPAR(6,J)**2))
C .....00008810
C .....00008820
C .....00008830
C .....00008840
ISN 0157 DO 170 I=1,NT
ISN 0158 K=ITRUNC+1-I
ISN 0159 Z=((DELH*(K-1))-FMU)/(ROOTZ*FSIG)
ISN 0160 R(K)=CERF(ABS(Z))
ISN 0161 IF (ABS(Z).GT.4.0) R(K)=1.0-R(K)
ISN 0163 R(K)=0.5*(1.-R(K))
ISN 0164 IF (Z.LT.0.0) R(K)=1.-R(K)
ISN 0166 170 CONTINUE
ISN 0167 RETURN
ISN 0168 END
.....00008930
.....00008940

*OPTIONS IN EFFECT* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,
*OPTIONS IN EFFECT* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF
*STATISTICS* SOURCE STATEMENTS = 167 ,PROGRAM SIZE = 4534
*STATISTICS* NO DIAGNOSTICS GENERATED
***** END OF COMPILATION *****
93K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NOECHK,LOAD,NOMAP,NOEDIT,ID,NOXREF		
ISN 0002	SUBROUTINE QSF(H,Y,Z,NDIM)	00008950
C		00008960
C	.....	00008970
C		00008980
C	SUBROUTINE QSF	00008990
C		00009000
C	PURPOSE	00009010
C	TO COMPUTE THE VECTOR OF INTEGRAL VALUES FOR A GIVEN	00009020
C	EQUIDISTANT TABLE OF FUNCTION VALUES.	00009030
C		00009040
C	USAGE	00009050
C	CALL QSF (H,Y,Z,NDIM)	00009060
C		00009070
C	DESCRIPTION OF PARAMETERS	00009080
C	H - THE INCREMENT OF ARGUMENT VALUES.	00009090
C	Y - THE INPUT VECTOR OF FUNCTION VALUES.	00009100
C	Z - THE RESULTING VECTOR OF INTEGRAL VALUES. Z MAY BE	00009110
C	IDENTICAL WITH Y.	00009120
C	NDIM - THE DIMENSION OF VECTORS Y AND Z.	00009130
C		00009140
C	REMARKS	00009150
C	NO ACTION IN CASE NDIM LESS THAN 3.	00009160
C		00009170
C	SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED	00009180
C	NONE	00009190
C		00009200
C	METHOD	00009210
C	BEGINNING WITH Z(1)=0, EVALUATION OF VECTOR Z IS DONE BY	00009220
C	MEANS OF SIMPSONS RULE TOGETHER WITH NEWTONS 3/8 RULE OR A	00009230
C	COMBINATION OF THESE TWO RULES. TRUNCATION ERROR IS OF	00009240
C	ORDER H**5 (I.E. FOURTH ORDER METHOD). ONLY IN CASE NDIM=3	00009250
C	TRUNCATION ERROR OF Z(2) IS OF ORDER H**4.	00009260
C	FOR REFERENCE, SEE	00009270
C	(1) F.B.HILDEBRAND, INTRODUCTION TO NUMERICAL ANALYSIS,	00009280
C	MCGRAW-HILL, NEW YORK/TORONTO/LONDON, 1956, PP.71-70.	00009290
C	(2) R.ZURMUEHL, PRAKTISCHE MATHEMATIK FUER INGENIEURE UND	00009300
C	PHYSIKER, SPRINGER, BERLIN/GOETTINGEN/HEIDELBERG, 1963,	00009310

	C	PP.214-221.	00009320
	C		00009330
	C	.....	00009340
	C		00009350
	C		00009360
	C		00009370
ISN 0003		DIMENSION Y(1),Z(1)	00009380
	C		00009390
ISN 0004		HT=.3333333*H	00009400
ISN 0005		IF (NDIM-5)7,8,1	00009410
	C		00009420
	C	NDIM IS GREATER THAN 5. PREPARATIONS OF INTEGRATION LOOP	00009430
ISN 0006	1	SUM1=Y(2)+Y(2)	00009440
ISN 0007		SUM1=SUM1+SUM1	00009450
ISN 0008		SUM1=HT*(Y(1)+SUM1+Y(3))	00009460
ISN 0009		AUX1=Y(4)+Y(4)	00009470
ISN 0010		AUX1=AUX1+AUX1	00009480
ISN 0011		AUX1=SUM1+HT*(Y(3)+AUX1+Y(5))	00009490
ISN 0012		AUX2=HT*(Y(1)+3.875*(Y(2)+Y(5))+2.625*(Y(3)+Y(4))+Y(6))	00009500
ISN 0013		SUM2=Y(5)+Y(5)	00009510
ISN 0014		SUM2=SUM2+SUM2	00009520
ISN 0015		SUM2=AUX2-HT*(Y(4)+SUM2+Y(6))	00009530
ISN 0016		Z(1)=0.	00009540
ISN 0017		AUX=Y(3)+Y(3)	00009550
ISN 0018		AUX=AUX+AUX	00009560
ISN 0019		Z(2)=SUM2-HT*(Y(2)+AUX+Y(4))	00009570
ISN 0020		Z(3)=SUM1	00009580
ISN 0021		Z(4)=SUM2	00009590
ISN 0022		IF (NDIM-6)5,5,2	00009600
	C		00009610
	C	INTEGRATION LOOP	00009620
ISN 0023	2	DO 4 I=7,NDIM,2	00009630
ISN 0024		SUM1=AUX1	00009640
ISN 0025		SUM2=AUX2	00009650
ISN 0026		AUX1=Y(I-1)+Y(I-1)	00009660
ISN 0027		AUX1=AUX1+AUX1	00009670
ISN 0028		AUX1=SUM1+HT*(Y(I-2)+AUX1+Y(I))	00009680
ISN 0029		Z(1-2)=SUM1	00009690
ISN 0030		IF (1-NDIM)3,6,6	00009700

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ISN 0031	3	AUX2=Y(I)+Y(I)	00009710
ISN 0032		AUX2=AUX2+AUX2	00009720
ISN 0033		AUX2=SUM2+HT*(Y(I-1)+AUX2+Y(I+1))	00009730
ISN 0034	4	Z(I-1)=SUM2	00009740
ISN 0035	5	Z(NDIM-1)=AUX1	00009750
ISN 0036		Z(NDIM)=AUX2	00009760
ISN 0037		RETURN	00009770
ISN 0038	6	Z(NDIM-1)=SUM2	00009780
ISN 0039		Z(NDIM)=AUX1	00009790
ISN 0040		RETURN	00009800
	C	END OF INTEGRATION LOOP	00009810
	C		00009820
ISN 0041	7	IF(NDIM-3)12,11,8	00009830
	C		00009840
	C	NDIM IS EQUAL TO 4 OR 5	00009850
ISN 0042	8	SUM2=1.125*HT*(Y(1)+Y(2)+Y(2)+Y(2)+Y(3)+Y(3)+Y(3)+Y(4))	00009860
ISN 0043		SUM1=Y(2)+Y(2)	00009870
ISN 0044		SUM1=SUM1+SUM1	00009880
ISN 0045		SUM1=HT*(Y(1)+SUM1+Y(3))	00009890
ISN 0046		Z(1)=0.	00009900
ISN 0047		AUX1=Y(3)+Y(3)	00009910
ISN 0048		AUX1=AUX1+AUX1	00009920
ISN 0049		Z(2)=SUM2-HT*(Y(2)+AUX1+Y(4))	00009930
ISN 0050		IF(NDIM-5)10,9,9	00009940
ISN 0051	9	AUX1=Y(4)+Y(4)	00009950
ISN 0052		AUX1=AUX1+AUX1	00009960
ISN 0053		Z(5)=SUM1+HT*(Y(3)+AUX1+Y(5))	00009970
ISN 0054	10	Z(3)=SUM1	00009980
ISN 0055		Z(4)=SUM2	00009990
ISN 0056		RETURN	00010000
	C		00010010
	C	NDIM IS EQUAL TO 3	00010020
ISN 0057	11	SUM1=HT*(1.25*Y(1)+Y(2)+Y(2)-.25*Y(3))	00010030
ISN 0058		SUM2=Y(2)+Y(2)	00010040
ISN 0059		SUM2=SUM2+SUM2	00010050
ISN 0060		Z(3)=HT*(Y(1)+SUM2+Y(3))	00010060
ISN 0061		Z(1)=0.	00010070
ISN 0062		Z(2)=SUM1	00010080
ISN 0063	12	RETURN	00010090

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ISN 0064

END

00010100

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 63 ,PROGRAM SIZE = 1234

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

117K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,								
ISN 0002	SUBROUTINE DPI (IPIC,IERR,ITER,NCONF,ICHOSE,NCHOSE,NOWAT)						00010110	
ISN 0003	DIMENSION IPIC(2), ICHOSE(2), NCONF(6), NCHOSE(2)						00010120	
ISN 0004	COMMON /USER3/BTRMX,SCSFL,TPRFL,OPSMS,ARRAYN(11,3),NMSEQ						00010121	
ISN 0005	COMMON /BTRN/WT,VOL,DT,U,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,II,PL,PLMIN,						00010130	
	* LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMWT,CONVWT,TKNWT,PASSTR,						00010131	
	* SATTWT,TPRIM,IBTLUC,RADA,RADAB,RAT,HTRPWR,HTRPRB,						00010132	
	* HPT,HTPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2),						00010133	
	* EOBLG,SAPDLG,SATWT						00010134	
ISN 0006	COMMON /DBCOM/INB(30),DATAB(55,90)						00010150	
ISN 0007	COMMON /CHOSE/ICHOSG(60),NCHOSG(60),COST(5,60),REL(6,60),						00010151	
	* THM(4,60),ARRAY(11,60),SKD(7,60)						00010152	
ISN 0008	COMMON /DPITAB/ HSRT(60),TLPTH(60),GRANH(60),XSRT(60),TLPTL(60),GR						00010160	
	LANL(60)						00010170	
ISN 0009	COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MMDOLD,TRUNC,ITRUMP,DE,TE,						00010171	
	* TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMP,SATR,SATINV,MER,						00010172	
	* MEINV,PAYR,PAUINV,PAYQUL,GSF,XLTOT,CTOT,FEEF,FEEINV,DDTE,XVEST,						00010173	
	* OPS,SKTAU(6),ROLD(60),TSRTI,AN,TS,DS,AM,TF,BF,TC,TA,TB,TOTOPS						00010174	
ISN 0010	DATA ACSRT,ACSDP,COMDP,OPREQ/10.,50.,6.,4./						00010181	
	C	INPUTS FOR DATA PROCESSING SUBSYSTEMS - DPI					00010190	
	C						00010200	
	C	INPUT	CDPI	T D	SOURCE	UNITS	DESCRIPTION	00010210
	C	VAR.	IN.					00010220
	C							00010230
	C	GRANH	36	R Y	ALL S/S		GRANULARITY HIGH RATE TABLE	00010240
	C	HSRT	35	R Y	ALL S/S	SPS	SAMPLE RATE HIGH TABLE	00010250
	C	TLPTH	34+35	K Y	ALL S/S		NO OF ANDL AND DIG POINTS HIGH	00010260
	C	GRANL	40	R Y	ALL S/S		GRANULARITY LOW RATE TABLE	00010270
	C	XSRT	39	R Y	ALL S/S	SPS	SAMPLE RATE LOW TABLE	00010280
	C	TLPTL	37+38	R Y	ALL S/S		NO OF ANDL AND DIG POINTS LOW	00010290
	C	SCSFL		R	U		SPECIAL COMMAND SYNC FLAG	00010300
	C	TOTCM	30TO32	R	DB		TOTAL NO OF COMMANDS	00010310
	C	COMTY		R	MACRO		NCONF(3) - SPEC OR GEN COMPUTER FLAG	00010320
	C	TTCPL	32	R			TIME TAG COMMAND FLAG	00010330
	C	TPRFL		R	U		TELEM PROCESS FLAG	00010340
	C	ACSSN		R	SC		SUM OF ACS SENSOR	00010350
	C	COMRT		R	COMM		COMMAND RATE	00010360
	C	OPSMS		R	U	SEC-1	MISSION OPS	00010370

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	C	MISPD	I	U	MISSION DATA PROC. FLAG	00010380
	C					00010390
	C				ERROR FLAGS	00010400
	C				IERR = 1 MUX IS REQUIRED	00010410
	C				IERR = 10 WORD LENGTH GREATER THAN 256	00010420
	C				IERR = 100 BIT RATE IS TOO LARGE	00010430
	C				IERR = 1000 SPECIAL COMMAND SYNC FLAG IS NOT EQUAL TO ZERO	00010440
	C				IERR = 10000 J1 .GE. J1t	00010450
	C					00010460
		ISN 0011			IERR=0	00010470
		ISN 0012			ICHOSE(1)=0	00010471
		ISN 0013			ICHOSE(2)=0	00010472
		ISN 0014			IF (ITER .EQ. 0) NCHOSE(1)=1	00010473
		ISN 0016			IF (ITER .EQ. 0) NCHOSE(2)=1	00010474
		ISN 0018			BITRAT(2)=0.	00010476
		ISN 0019			IERR1=0.	00010480
		ISN 0020			IERR2=0	00010490
		ISN 0021			IERR3=0	00010500
		ISN 0022			IERR4=0	00010510
		ISN 0023			IERR5=0	00010520
		ISN 0024			NEWFL=0	00010530
		ISN 0025			IF (NCONF(3) .EQ. 2 .AND. NCONF(4) .GT. 3)	00010560
					* CALL MIS(IPIC,IERR,ITER,NCONF,ICHOSE,NCHOSE)	00010561
		ISN 0027			IF (NCONF(3) .EQ. 2 .AND. NCONF(4) .GT. 3) GO TO 110	00010580
		ISN 0029			NEWFL=1	00010590
		ISN 0030	110		CONTINUE	00010600
		ISN 0031			ANULH=0.	00010610
		ISN 0032			ANOLL=0.	00010620
		ISN 0033			MUX=0	00010630
	C				COMPUTE TABLES	00010640
		ISN 0034			TOTCM=0	00010650
		ISN 0035			TTCFL=0	00010660
		ISN 0036			NTABH=0	00010670
		ISN 0037			NTABL=0	00010680
	C	ISN 0038			***** WE NEED NTAB *****	00010690
					NTAB=NOWAT - 1	00010700
	C				*****	00010710
		ISN 0039			K= -1	00010720
		ISN 0040			DO 170 I=1,NTAB	00010730

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ISN 0041		TOTCM=(ARRAY(K+2,I)+ARRAY(K+3,I)+ARRAY(K+4,I))*NCHOSG(I)+TOTCM	00010740
ISN 0042		TTCFL=TTCFL+ARRAY(K+4,I)*NCHOSG(I)	00010750
ISN 0043		IF (ARRAY(K+7,I).EQ.0.) GO TO 150	00010760
ISN 0045		NTABH=NTABH+1	00010770
ISN 0046		HSRT(NTABH)=ARRAY(K+7,I)	00010780
ISN 0047		GRANH(NTABH)=ARRAY(K+8,I)	00010790
ISN 0048		TLPTH(NTABH)=(ARRAY(K+5,I)+ARRAY(K+6,I))*NCHOSG(I)	00010800
ISN 0049	150	IF (ARRAY(K+6,I).NE.0.) MUX=1	00010810
ISN 0051		IF (ARRAY(K+11,I).EQ.0.) GO TO 160	00010820
ISN 0053		NTABL=NTABL+1	00010830
ISN 0054		XSRT(NTABL)=ARRAY(K+11,I)	00010840
ISN 0055		GRANL(NTABL)=ARRAY(K+12,I)	00010850
ISN 0056		TLPTL(NTABL)=(ARRAY(K+9,I)+ARRAY(K+10,I))*NCHOSG(I)	00010860
ISN 0057	160	IF (ARRAY(K+10,I).NE.0.) MUX=1	00010870
ISN 0059		ANOLH=ANOLH+ARRAY(K+5,I)*NCHOSG(I)	00010880
ISN 0060	170	ANOLL=ANOLL+ARRAY(K+9,I)*NCHOSG(I)	00010890
ISN 0061		IF (NEWFL.EQ.0) GO TO 240	00010900
	C	***** WE NEED NTABN *****	00010910
ISN 0063		NTABN= NMSEQ	00010920
	C	***** *****	00010930
ISN 0064		K= -1	00010940
ISN 0065		DO 230 I=1,NTABN	00010950
ISN 0066		TOTCM=TOTCM+ARRAYN(K+2,I)+ARRAYN(K+3,I)+ARRAYN(K+4,I)	00010960
ISN 0067		TTCFL=TTCFL+ARRAYN(K+4,I)	00010970
ISN 0068		IF (ARRAYN(K+7,I).EQ.0.) GO TO 210	00010980
ISN 0070		NTABH=NTABH+1	00010990
ISN 0071		HSRT(NTABH)=ARRAYN(K+7,I)	00011000
ISN 0072		GRANH(NTABH)=ARRAYN(K+8,I)	00011010
ISN 0073		TLPTH(NTABH)=ARRAYN(K+5,I)+ARRAYN(K+6,I)	00011020
ISN 0074	210	IF (ARRAYN(K+6,I).NE.0.) MUX=1	00011030
ISN 0076		IF (ARRAYN(K+11,I).EQ.0.) GO TO 220	00011040
ISN 0078		NTABL=NTABL+1	00011050
ISN 0079		XSRT(NTABL)=ARRAYN(K+11,I)	00011060
ISN 0080		GRANL(NTABL)=ARRAYN(K+12,I)	00011070
ISN 0081		TLPTL(NTABL)=ARRAYN(K+9,I)+ARRAYN(K+10,I)	00011080
ISN 0082	220	IF (ARRAYN(K+10,I).NE.0.) MUX=1	00011090
ISN 0084		ANOLH=ANOLH+ARRAYN(K+5,I)	00011100
ISN 0085	230	ANOLL=ANOLL+ARRAYN(K+9,I)	00011110
ISN 0086	240	CONTINUE	00011120

	C	ANOLH--NO OF ANOL PTS IN HIGH TAB	00011130
	C	ANOLL -NO OF ANOL PTS IN LOW TAB	00011140
ISN 0087		IF (MUX.NE.0) IERR1=1	00011150
ISN 0089		IERR=IERR+IERR1	00011160
	C	COUNT NUMBER OF POINTS OF ALL TABLES	00011170
ISN 0090		SUMTLP=0.	00011180
ISN 0091		JL=0	00011190
ISN 0092		BTRFL=0	00011200
ISN 0093		IF (BTRMX.NE.1.024E6) BTRFL=1	00011210
	C	ORDER TELEM POINTS BY SAMPLE RATE - HIGH	00011220
ISN 0095		IF (NTABH.EQ.1) GO TO 280	00011230
ISN 0097	250	CONTINUE	00011240
ISN 0098		CALL ORDER (NTABH,HSRT,TLPTH,GRANH,XM2,MEDIAN)	00011250
ISN 0099		JL=JL+1	00011260
ISN 0100		IF (JL.EQ.2) GO TO 280	00011270
ISN 0102		DO 270 I=1,MEDIAN	00011280
ISN 0103	260	IF (HSRT(I).LE.XM2) GO TO 270	00011290
ISN 0105		HSRT(I)=HSRT(I)/2.	00011300
ISN 0106		TLPTH(I)=2.*TLPTH(I)	00011310
ISN 0107		GO TO 260	00011320
ISN 0108	270	CONTINUE	00011330
ISN 0109		GO TO 250	00011340
ISN 0110	280	SSR=HSRT(1)	00011350
	C	SSR = MAIN FRAME RATE	00011360
ISN 0111		JL=0	00011370
ISN 0112		IF (NTABH.EQ.1) GO TO 320	00011380
ISN 0114	290	CONTINUE	00011390
ISN 0115		CALL ORDER (NTABH,GRANH,TLPTH,HSRT,XM2,MEDIAN)	00011400
ISN 0116		JL=JL+1	00011410
ISN 0117		IF (JL.EQ.2) GO TO 320	00011420
ISN 0119		DO 310 I=1,MEDIAN	00011430
ISN 0120	300	IF (GRANH(I).LE.XM2) GO TO 310	00011440
ISN 0122		GRANH(I)=GRANH(I)/2.	00011450
ISN 0123		TLPTH(I)=2.*TLPTH(I)	00011460
ISN 0124		GO TO 300	00011470
ISN 0125	310	CONTINUE	00011480
ISN 0126		GO TO 290	00011490
ISN 0127	320	SUMWH=0	00011500
ISN 0128		DO 330 I=1,NTABH	00011510

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ORIGINAL PAGE IS  
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ISN 0129	330	SUMWH=SUMWH+TLPTH(I)	00011520
	C	SUMWH = NUMBER OF WORDS	00011530
ISN 0130		SUMWH=SUMWH*1.2	00011540
ISN 0131		IF (SUMWH.LE.256.) GO TO 340	00011550
ISN 0133		ICHOSE(1)=-1	00011560
ISN 0134		IERR2=10	00011570
ISN 0135		IERR=IERR+IERR2	00011580
ISN 0136		RETURN	00011590
ISN 0137	340	POWER=16.	00011600
ISN 0138		DO 350 NN=5,6	00011610
ISN 0139		N=NN	00011620
ISN 0140		POWER=POWER*2.	00011630
ISN 0141		IF (POWER.GE.SUMWH) GO TO 360	00011640
ISN 0143	350	CONTINUE	00011650
ISN 0144	360	TLMWD=POWER	00011660
	C	MAIN FRAME LENGTH - TLMWD	00011670
	C	WDLMAX = WORD LENGTH TO MAX REQUIRED LENGTH	00011680
ISN 0145		WDLMAX=N	00011690
ISN 0146		BIRATE=WDLMAX*TLMWD*SSR	00011700
ISN 0147		DO 370 MM=1,18	00011710
ISN 0148		N=MM-1	00011720
ISN 0149		TT=2.**N*7.8125	00011730
ISN 0150		IF (TT.GE.BIRATE) GO TO 380	00011740
ISN 0152	370	CONTINUE	00011750
ISN 0153		ICHOSE(1)=-1	00011760
ISN 0154		IERR3=100	00011770
ISN 0155		IERR=IERR+IERR3	00011780
	C	IERR = 100 BIT RATE TOO LARGE	00011790
ISN 0156		RETURN	00011800
ISN 0157	380	BIRATE=TT	00011810
ISN 0158		BITRAT(1)=BIRATE	00011815
ISN 0159		JL=0	00011820
	C	ORDER LOW SAMPLE RATE	00011830
ISN 0160		IF (NTABL.EQ.1) GO TO 420	00011840
ISN 0162	390	CONTINUE	00011850
ISN 0163		CALL ORDER (NTABL,XSR1,TLPTL,GRANL,XM2,MEDIAN)	00011860
ISN 0164		JL=JL+1	00011870
ISN 0165		IF (JL.EQ.2) GO TO 420	00011880
ISN 0167		DO 410 I=1,MEDIAN	00011890

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ORIGINAL PAGE IS  
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	ISN 0168	400	IF (XSRT(I).LE.XM2) GO TO 410		00011900
	ISN 0170		XSRT(I)=XSRT(I)/2.		00011910
	ISN 0171		TLPTL(I)=TLPTL(I)*2.		00011920
	ISN 0172		GO TO 400		00011930
	ISN 0173	410	CONTINUE		00011940
	ISN 0174		GO TO 390		00011950
	ISN 0175	420	SFR=XSRT(I)		00011960
		C	SFR = HIGHEST RATE IN LOW RATE TABLE		00011970
	ISN 0176		SFL=SSR/SFR		00011980
		C	SFL SUB FRAME LENGTH		00011990
	ISN 0177		N=5		00012000
	ISN 0178		IF (SFL.LE.2.**N) GO TO 440		00012010
	ISN 0180		N=7		00012020
	ISN 0181		IF (SFL.GE.2.**N) GO TO 440		00012030
	ISN 0183		DO 430 N=5,7		00012040
	ISN 0184		NPI=N+1		00012050
	ISN 0185		IF (SFL.GE.2.**N.AND.SFL.LE.2.**NPI) GO TO 440		00012060
	ISN 0187	430	CONTINUE		00012070
861-6	ISN 0188	440	SFL=2.**N		00012080
	ISN 0189		SUMWL=0.		00012090
	ISN 0190		DO 450 I=1,NTABL		00012100
	ISN 0191	450	SUMWL=SUMWL+TLPTL(I)		00012110
	ISN 0192		SUMWL=SUMWL*1.2		00012120
	ISN 0193		NSUBFR=SUMWL/SFL+1		00012130
		C	(1) BIT RATE	TT	00012140
		C	(2) WORD LENGTH	WDLMAX	00012150
		C	(3) NUMBER OF M/F WORDS	TLMWD	00012160
		C	(4) NUMBER OF SUBFRAMES	NSUBFR	00012170
		C	(5) NUMBER OF WORDS PER S/F	SFL	00012180
		C	(6) NEED FOR DIGITAL MUX	MUX	00012190
		C			00012200
		C	SPECIAL COMMAND SYNC FLAG		00012210
	ISN 0194		IF (SCSFL.NE.0.) IERR4=1000		00012220
	ISN 0196		IERR=IERR+IERR4		00012230
	ISN 0197		TOTCM=TOTCM*1.5		00012240
	ISN 0198		DO 460 NN=1,100		00012250
	ISN 0199		N=NN		00012260
	ISN 0200		IF (TOTCM.LE.2.**N) GO TO 470		00012270
	ISN 0202	460	CONTINUE		00012280

ISN 0203	470	TOTCM=2.**N	00012290
ISN 0204		COWDLN=N	00012300
ISN 0205		M=NCONF(3)	00012310
ISN 0206		GO TO (480,500), M	00012320
ISN 0207	480	TLMOPS=0	00012330
ISN 0208		IF (TPRFL.NE.0.) TLMOPS=TT*OPREQ/WDLMAX	00012340
ISN 0210		IF (TPRFL.NE.0.) GO TO 490	00012350
ISN 0212		J1=IDB(1)+1	00012360
ISN 0213		IPIC(2)=J1	00012370
ISN 0214		ICHOSE(2)=DATAB(1,J1)	00012380
ISN 0215		IF (ITEK.EQ.0) NCHOSE(2)= 1	00012390
ISN 0217		WT= WT + NCHOSE(2)*DATAB(23,J1)	00012400
ISN 0218		VOL= VOL + NCHOSE(2)*DATAB(24,J1)	00012410
ISN 0219		PL= PL + NCHOSE(2)*DATAB(16,J1)	00012420
ISN 0220		PLMIN= PLMIN + NCHOSE(2)*DATAB(18,J1)	00012430
ISN 0221	490	CONTINUE	00012440
ISN 0222		ACSOPS=ACSSN*ACSRT*ACSOP	00012450
ISN 0223		CMDOPS=COMRT*COMOP	00012460
ISN 0224		TOTOPS=TLMOPS+ACSOPS+CMDOPS+DPSMS	00012470
ISN 0225		TOTOPS=TOTOPS*1.2*1.5	00012480
ISN 0226	500	IF (ITER.NE.0) GO TO 510	00012490
ISN 0228		IERR=0	00012500
ISN 0229		NEQUIP=2	00012510
ISN 0230		ICHOSE(1)=0	00012520
ISN 0231	510	L=1	00012530
ISN 0232		J1E=IDB(M)	00012540
ISN 0233		IF (IPIC(L).NE.0) GO TO 520	00012550
ISN 0235		J1=1	00012560
ISN 0236		IF (M.NE.1) J1=IDB(M-1)+1	00012570
ISN 0238		GO TO 540	00012580
ISN 0239	520	IF (ITFR.EQ.0) GO TO 530	00012590
ISN 0241		J1=IPIC(L)	00012600
ISN 0242		GO TO 540	00012610
ISN 0243	530	IF (J1.GE.J1E) GO TO 570	00012620
ISN 0245		J1=IPIC(L)+1	00012630
ISN 0246	540	HARPAR=DATAB(6,J1)*1000.	00012640
ISN 0247		GO TO (560,550), M	00012650
ISN 0248	550	IPIC(L)=J1	00012660
ISN 0249		ICHOSE(L)=DATAB(1,J1)	00012670

ISN 0250		IF (ITER.EQ.0) NCHOSE(L)=1	
ISN 0252		WT= WT + NCHOSE(L)*DATAB(23,J1)	00012680
ISN 0253		VOL= VOL + NCHOSE(L)*DATAB(24,J1)	00012690
ISN 0254		PL= PL + NCHOSE(L)*DATAB(16,J1)	00012700
ISN 0255		PLMIN= PLMIN + NCHOSE(L)*DATAB(18,J1)	00012710
ISN 0256		RETURN	00012720
ISN 0257	560	HARPAR=DATAB(6,J1)*1000.	00012730
ISN 0258		IF (TOTOPS.LE.HARPAR) GO TO 550	00012740
ISN 0260		IF (J1.GE.J1E) GO TO 570	00012750
ISN 0262		J1=J1+1	00012760
ISN 0263		GO TO 560	00012770
ISN 0264	570	IERR5=10000	00012780
ISN 0265		IERR=IERR+IERR5	00012790
ISN 0266		ICHOSE(L)=-1	00012800
ISN 0267		RETURN	00012810
ISN 0268		END	00012820
			00012830

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 267 ,PROGRAM SIZE = 5140

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\* 81K BYTES OF CORE NOT USED

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COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K, SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF			
ISN 0002		SUBROUTINE ORDER (N,A,B,C,XM2,MEDIAN)	00012840
	C	ORDERS ARRAYS AND GETS MEDIAN VALUES	00012850
ISN 0003		DIMENSION A(1), B(1), C(1)	00012860
ISN 0004		MEDIAN=N/2	00012870
ISN 0005		KK=MEDIAN*2	00012880
ISN 0006		KKK=2	00012890
ISN 0007		IF (KK.NE.N) KKK=1	00012900
	C	KKK = 1 , ODD NUMBER OF POINTS	00012910
ISN 0009		DO 20 I=1,N	00012920
ISN 0010		IF (A(I).EQ.0.) GO TO 20	00012930
ISN 0012		XLG=A(I)	00012940
ISN 0013		JJ=I	00012950
ISN 0014		DO 10 J=I,N	00012960
ISN 0015		IF (XLG.GE.A(J)) GO TO 10	00012970
ISN 0017		XLG=A(J)	00012980
ISN 0018		JJ=J	00012990
ISN 0019	10	CONTINUE	00013000
ISN 0020		IF (I.EQ.JJ) GO TO 20	00013010
ISN 0022		AS=A(I)	00013020
ISN 0023		BS=B(I)	00013030
ISN 0024		CS=C(I)	00013040
ISN 0025		A(I)=A(JJ)	00013050
ISN 0026		B(I)=B(JJ)	00013060
ISN 0027		C(I)=C(JJ)	00013070
ISN 0028		A(JJ)=AS	00013080
ISN 0029		B(JJ)=BS	00013090
ISN 0030		C(JJ)=CS	00013100
ISN 0031	20	CONTINUE	00013110
ISN 0032		GO TO (30,40), KKK	00013120
ISN 0033	30	XM2=A(MEDIAN)*2.	00013130
ISN 0034		RETURN	00013140
ISN 0035	40	XM2=A(MEDIAN)+A(MEDIAN+1)	00013150
ISN 0036		RETURN	00013160
ISN 0037		END	00013170

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OF POOR QUALITY

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
\*OPTIONS IN EFFECT\* SOURCE,EBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,ID,NOXREF



**\*STATISTICS\*** SOURCE STATEMENTS = 36 , PROGRAM SIZE = 824

**\*STATISTICS\*** NO DIAGNOSTICS GENERATED

**\*\*\*\*\*** END OF COMPILATION **\*\*\*\*\*** 125K BYTES OF CORE NOT USED

COMPILER OPTIONS - NAME= MAIN,OPT=01,LINECNT=41,SIZE=0000K,  
SOURCE,EBDCIC,NOLIST,MODECK,LOAD,NOMAP,MOEDIT,IO,NOXREF

ISN 0002	SUBROUTINE MIS (IPIC,IERR,ITER,NCONF,ICHOSE,NCHOSE)	00013180
ISN 0003	DIMENSION IPIC(2), ICHOSE(2), NCONF(6), NCHOSE(2)	00013190
ISN 0004	COMMON /USER3/BTRMX,SCSFL,TPRFL,OPSMS,ARAYN(11,3),NMSEQ	00013191
ISN 0005	COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLMIN, * LMBDD,AREA,SATLG,WATE,NC,ACSWP,HARNWT,THCMT,CONVWT,TKWT,PASSTR, * SATTWT,TPRIM,IBTLOC,RADA,RADAB,RAT,HTRPWR,HTRPRB, * HPT,HPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2), * EQLLG,SABOLG,SATWT	00013192 00013193 00013194 00013195 00013196
ISN 0006	COMMON /DBCOM/IDB(30),DATAB(55,90)	00013200
ISN 0007	COMMON /CHOSE/ICHOSE(60),NCHUSG(60),COST(5,60),REL(6,60), * THM(4,60),ARRAY(11,60),SKD(7,60)	00013210 00013220
ISN 0008	COMMON /MISTAB/ HSRT(60),TLPTH(60),GRANH(60),XSRT(60),TLPTL(60),GRANL(60)	00013230 00013240
C	INPUTS FOR DATA PROCESSING SUBSYSTEMS - MIS	00013260
C		00013270
C	INPUT CDPI T D SOURCE UNITS DESCRIPTION	00013280
C	VAR. IN.	00013290
C		00013300
C	GRANH 36 R Y ALL S/S GRANULARITY HIGH RATE TABLE	00013310
C	HSRT 35 R Y ALL S/S SPS SAMPLE RATE HIGH TABLE	00013320
C	TLPTH 34+35 R Y ALL S/S NO OF ANOL AND DIG POINTS HIGH	00013330
C	GRANL 40 R Y ALL S/S GRANULARITY LOW RATE TABLE	00013340
C	XSRT 39 R Y ALL S/S SPS SAMPLE RATE LOW TABLE	00013350
C	TLPTL 37+38 R Y ALL S/S NO OF ANOL AND DIG POINTS LOW	00013360
C	SCSFL R U SPECIAL COMMAND SYNC FLAG	00013370
C	TOTCM 30T032 R DB TOTAL NO OF COMMANDS	00013380
C	COMTY R MACRO NCONF(3) - SPEC OR GEN COMPUTER FLAG	00013390
C	TTCPL 32 R TIME TAG COMMAND FLAG	00013400
C	TPRFL R U TELEM PROCESS FLAG	00013410
C	ACSSN R SC SUM OF ACS SENSOR	00013420
C	COMRT R COMH COMMAND RATE	00013430
C	GPSMS R U SEC-1 MISSION OPS	00013440
C	MISPD I U MISSION DATA PROC. FLAG	00013450
C		00013460
C	ERROR FLAGS	00013470
C	IERR = 1 MUX IS REQUIRED	00013480
C	IERR = 10 WORD LENGTH GREATER THAN 256	00013490

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	C	IERR = 100 BIT RATE IS TOO LARGE	00013500
	C	IERR = 1000 SPECIAL COMMAND SYNC FLAG IS NOT EQUAL TO ZERO	00013510
	C	IERR = 10000 JI .GE. JIE	00013520
	C		00013530
ISN 0009		IERR=0	00013540
ISN 0010		IERR1=0	00013550
ISN 0011		IERR2=0	00013560
ISN 0012		ICPR3=0	00013570
ISN 0013		IERR4=0	00013580
ISN 0014		IERR5=0	00013590
ISN 0015		ANOLH=0.	00013600
ISN 0016		ANOLL=0.	00013610
ISN 0017		MUX=0	00013620
	C	COMPUTE TABLES	00013630
ISN 0018		TOTCM=0	00013640
ISN 0019		TTCFL=0	00013650
ISN 0020		NTABH=0	00013660
ISN 0021		NTABL=0	00013670
9-204	C	***** WE NEED NTABN *****	00013680
ISN 0022		NTABN= NMSEQ	00013690
	C	*****	00013700
ISN 0023		K= -1	00013710
ISN 0024		DO 60 I=1,NTABN	00013720
ISN 0025		TOTCM=TOTCM+ARRAYN(K+2,I)+ARRAYN(K+3,I)+ARRAYN(K+4,I)	00013730
ISN 0026		TTCFL=TTCFL+ARRAYN(K+4,I)	00013740
ISN 0027		IF (ARRAYN(K+7,I).EQ.0.) GO TO 40	00013750
ISN 0029		NTABH=NTABH+1	00013760
ISN 0030		HSPT(NTABH)=ARRAYN(K+7,I)	00013770
ISN 0031		GRANH(NTABH)=ARRAYN(K+8,I)	00013780
ISN 0032		TLPTH(NTABH)=ARRAYN(K+5,I)+ARRAYN(K+6,I)	00013790
ISN 0033	40	IF (ARRAYN(K+6,I).NE.0.) MUX=1	00013800
ISN 0035		IF (ARRAYN(K+11,I).EQ.0.) GO TO 50	00013810
ISN 0037		NTABL=NTABL+1	00013820
ISN 0038		XSRT(NTABL)=ARRAYN(K+11,I)	00013830
ISN 0039		GRANL(NTABL)=ARRAYN(K+12,I)	00013840
ISN 0040		TLPTL(NTABL)=ARRAYN(K+9,I)+ARRAYN(K+10,I)	00013850
ISN 0041	50	IF (ARRAYN(K+10,I).NE.0.) MUX=1	00013860
ISN 0043		ANOLH=ANOLH+ARRAYN(K+5,I)	00013870
ISN 0044	60	ANOLL=ANOLL+ARRAYN(K+9,I)	00013880

	C	ANOLH--NO OF ANOL PTS IN HIGH TAB	00013890
ISN 0045	C	ANOLL -NO OF ANOL PTS IN LOW TAB	00013900
ISN 0047		IF (MUX.NE.0) IERR1=1	00013910
		IERR=IERR+IERR1	00013920
ISN 0048	C	COUNT NUMBER OF POINTS OF ALL TABLES	00013930
		SUMTLP=0.	00013940
ISN 0049		JL=0	00013950
ISN 0050		BTRFL=0	00013960
ISN 0051		IF (BTRMX.NE.1.024E6) BTRFL=1	00013970
	C	ORDER TELM POINTS BY SAMPLE RATE - HIGH	00013980
ISN 0053		IF (NTABH.EQ.1) GO TO 100	00013990
ISN 0055	70	CONTINUE	00014000
ISN 0056		CALL ORDER (NTABH,HSRT,TLPTH,GRANH,XM2,MEDIAN)	00014010
ISN 0057		JL=JL+1	00014020
ISN 0058		IF (JL.EQ.2) GO TO 100	00014030
ISN 0060		DO 90 I=1,MEDIAN	00014040
ISN 0061	80	IF (HSRT(I).LE.XM2) GO TO 90	00014050
ISN 0063		HSRT(I)=HSRT(I)/2.	00014060
ISN 0064		TLPTH(I)=2.*TLPTH(I).	00014070
ISN 0065		GO TO 80	00014080
ISN 0066	90	CONTINUE	00014090
ISN 0067		GO TO 70	00014100
ISN 0068	100	SSR=HSRT(1)	00014110
	C	SSR = MAIN FRAME RATE	00014120
ISN 0069		IF (NTABH.EQ.1) GO TO 140	00014130
ISN 0071		JL=0	00014140
ISN 0072	110	CONTINUE	00014150
ISN 0073		CALL ORDER (NTABH,GRANH,TLPTH,HSRT,XM2,MEDIAN)	00014160
ISN 0074		JL=JL+1	00014170
ISN 0075		IF (JL.EQ.2) GO TO 140	00014180
ISN 0077		DO 130 I=1,MEDIAN	00014190
ISN 0078	120	IF (GRANH(I).LE.XM2) GO TO 130	00014200
ISN 0080		GRANH(I)=GRANH(I)/2.	00014210
ISN 0081		TLPTH(I)=2.*TLPTH(I)	00014220
ISN 0082		GO TO 120	00014230
ISN 0083	130	CONTINUE	00014240
ISN 0084		GO TO 110	00014250
ISN 0085	140	SUMWH=0	00014260
ISN 0086		DO 150 I=1,NTABH	00014270

ISN 0087	150	SUMWH=SUMWH+TLPTH(1)	00014280
	C	SUMWH = NUMBER OF WORDS	00014290
ISN 0088		SUMWH=SUMWH*1.2	00014300
ISN 0089		IF (SUMWH.LE.256.) GO TO 160	00014310
ISN 0091		ICHOSE(1)=-1	00014320
ISN 0092		IERR2=10	00014330
ISN 0093		IERR=IERR+IERR2	00014340
ISN 0094		RETURN	00014350
ISN 0095	160	POWER=16.	00014360
ISN 0096		DO 170 NN=5,8	00014370
ISN 0097		N=NN	00014380
ISN 0098		POWER=POWER*2.	00014390
ISN 0099		IF (POWER.GE.SUMWH) GO TO 180	00014400
ISN 0101	170	CONTINUE	00014410
ISN 0102	180	TLMWD=POWER	00014420
	C	MAIN FRAME LENGTH - TLMWD	00014430
	C	WDLMAX = WORD LENGTH TO MAX REQUIRED LENGTH	00014440
ISN 0103		WDLMAX=N	00014450
ISN 0104		BIRATE=WDLMAX*TLMWD*SSR	00014460
ISN 0105		DO 190 MM=1,10	00014470
ISN 0106		N=MM-1	00014480
ISN 0107		TT=2.**N*7.8125	00014490
ISN 0108		IF (TT.GE.BIRATE) GO TO 200	00014500
ISN 0110	190	CONTINUE	00014510
ISN 0111		ICHOSE(1)=-1	00014520
ISN 0112		IERR3=100	00014530
ISN 0113		IERR=IERR+IERR3	00014540
	C	IERR = 100 BIT RATE TOO LARGE	00014550
ISN 0114		RETURN	00014560
ISN 0115	200	BIRATE=TT	00014570
ISN 0116		BITRAT(2)=BIRATE	00014575
ISN 0117		IF (NTABL.EQ.1) GO TO 240	00014580
ISN 0119		JL=0	00014590
	C	ORDER LOW SAMPLE RATE	00014600
ISN 0120	210	CONTINUE	00014610
ISN 0121		CALL ORDER (NTABL,XSRT,TLPTL,GRANL,XM2,MEDIAN)	00014620
ISN 0122		JL=JL+1	00014630
ISN 0123		IF (JL.EQ.2) GO TO 240	00014640
ISN 0125		DO 230 I=1,MEDIAN	00014650

	ISN 0126	220	IF (XSRT(I).LE.XM2) GO TO 230		00014660
	ISN 0128		XSRT(I)=XSRT(1)/2.		00014670
	ISN 0129		TLPTL(I)=TLPTL(1)*2.		00014680
	ISN 0130		GO TO 220		00014690
	ISN 0131	230	CONTINUE		00014700
	ISN 0132		GO TO 210		00014710
	ISN 0133	240	SFR=XSRT(1)		00014720
		C	SFR = HIGHEST RATE IN LOW RATE TABLE		00014730
	ISN 0134		SFL=SSR/SFR		00014740
		C	SFL SUB FRAME LENGTH		00014750
	ISN 0135		N=5		00014760
	ISN 0136		IF (SFL.LE.2.**N) GO TO 260		00014770
	ISN 0138		N=7		00014780
	ISN 0139		IF (SFL.GE.2.**N) GO TO 260		00014790
	ISN 0141		DO 250 N=5,7		00014800
	ISN 0142		NP1=N+1		00014810
	ISN 0143		IF (SFL.GE.2.**N.AND.SFL.LE.2.**NP1) GO TO 260		00014820
	ISN 0145	250	CONTINUE		00014830
	ISN 0146	260	SFL=2.**N		00014840
	ISN 0147		SUMWL=0.		00014850
	ISN 0148		DO 270 I=1,NTABL		00014860
9-207	ISN 0149	270	SUMWL=SUMWL+TLPTL(I)		00014870
	ISN 0150		SUMWL=SUMWL*1.2		00014880
	ISN 0151		NSUBFR=SUMWL/SFL+1		00014890
		C	(1) BIT RATE	TT	00014900
	C	(2) WORD LENGTH	WDLMAX	00014910	
	C	(3) NUMBER OF M/F WORDS	TLMWD	00014920	
	C	(4) NUMBER OF SUBFRAMES	NSUBFR	00014930	
	C	(5) NUMBER OF WORDS PER S/F	SFL	00014940	
	C	(6) NEED FOR DIGITAL MUX	MUX	00014950	
		C			00014960
	ISN 0152		J1=IDB(1)+1		00014970
	ISN 0153		IPIC(2)=J1		00014980
	ISN 0154		ICHOSE(2)=DATAB(1,J1)		00014990
	ISN 0155		IF(ITER.EQ.0) NCHOSE(2)=1		00015000
	ISN 0157		WT= WT + NCHOSE(2)*DATAB(23,J1)		00015010
	ISN 0158		VOL= VOL + NCHOSE(2)*DATAB(24,J1)		00015020
	ISN 0159		PL= PL + NCHOSE(2)*DATAB(16,J1)		00015030
	ISN 0160		PLMIN= PLMIN + NCHOSE(2)*DATAB(18,J1)		00015040

ISN 0161  
ISN 0162

RETURN  
END

00015050  
00015060

\*OPTIONS IN EFFECT\* NAME= MAIN,OPT=01,LINECNT=+1,SIZE=0000K,

\*OPTIONS IN EFFECT\* SOURCE,FBCDIC,NOLIST,NODECK,LOAD,NOMAP,NOEDIT,LD,NOXREF

\*STATISTICS\* SOURCE STATEMENTS = 161 ,PROGRAM SIZE = 2900

\*STATISTICS\* NO DIAGNOSTICS GENERATED

\*\*\*\*\* END OF COMPILATION \*\*\*\*\*

101K BYTES OF CORE NOT USED

\*STATISTICS\* NO DIAGNOSTICS THIS STEP

10. DETAILED FLOW CHARTS

The following are detailed flow charts of the entire model.

PRECEDING PAGE BLANK NOT FILMED



#DECK NASA  
C THIS IS THE MAIN DRIVER  
C IT SEQUENCES ALL SEGMENTS OF COORD. HANDLES I/O. SETS  
C CONFIGURATIONS

COMMON /USER1/DPHI,FE,TSMALL,XMU,POOT0,TAUX,TAUY,TAUZ,T,  
PHIRX,PHIRY,PHIRZ,POOTX,POOTY,POOTZ,XN,YN,ZN,POOTRX,POOTRY,  
POOTRZ,OMEGS,OMEGA,PJ,XNN,K,MANY,IPARM,EP1,AX,AY,AZ,  
EA,EANT,ALPHA,TL,TACCEL,XMM,THOLD,POOTAV,POOTST,PHIFOV,ISAT

COMMON /USER2/TINST,CLIFE  
COMMON /USER3/BTRMX,SCSFL,TPRFL,OPSMS,ARRAYN(11,3),NASEQ

COMMON /USER4/IPTCH(3),IMSSEP,ISEQ,LSOLS,LUSB,FREQ(2),APOGEE,  
NET,NADIR,FREQR,COMRT,BWIDTH(2)

COMMON /USER5/IVOLT,OPTENP

COMMON /USER6/EQPF,MOI2SH,EQMIKL,EQMIYL,EQMIZL,EQ2KL,EQ2YL,  
EQ2ZL,ISBOFD,NUMED,EEQNT(9),EEQVL(9),EMVCG,EMIZCG,EM2YCG,  
EMZCG,CDEEX(9),EELOC(9),XCOSA1,XCOSA3

COMMON /USER7/ISATOR,ORGINC  
COMMON /USER8/SKONE(7,3)  
COMMON /USER9/CA,CE

COMMON /BTRN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLIN,  
LMDD,AREA,SATLG,WATE,NC,ACSWP,HARNMT,THCRMT,CONVMT,TXMT,PASSTA,  
SATWT,TPRM,IBTLOC,RADR,RADQ,RAT,HTPRM,HTPRD,  
HPT,HTPIE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSM,BITRAT(2),  
EQBLG,SABLO,SATWT

COMMON /DBCOM/IOB(30),DATA(55,90)  
COMMON /USER1/EQ1WT,EQ2WT,DTMAX,ALT  
COMMON /USER/KEOPT,SYSLB,RFIXED,SLBMX,[SPT,SPEC(6),SPEC1,[SUB

COMMON /CHOSE/[CHOSE(60),NCHOSE(60),COST(5,60),REL(6,60),TMM(4,60),  
DPIA(11,60),SKD(7,60)

COMMON /USERC/NFV,NQV,XMER,XMEU,FEEPCT,IMETYP

COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MADOLD,TRUNC,ITRUNC,DE,TE,  
TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMP,SATR,SATINV,MR,  
MEINV,PAYR,PAYINV,PAYOUL,GSE,XLTOT,CTOT,FEER,FEEINV,ODTE,XVEST,  
OPS,SKTAU(6),ROLD(60),TTF,AN,TS,BS,AM,TF,BF,TC,TA,TB,TOTOPS

DIMENSION NCONF(6),NEQUIP(5),IERR(7),IPIC(13),IPIC2(9),IPIC3(2),  
IPIC4(9),IPICS(5),ICHOS1(9),ICHOS2(14),ICHOS3(2),ICHOS4(11),  
ICHOS5(5),NCHOS1(9),NCHOS2(14),NCHOS3(2),NCHOS4(11),NCHOS5(5)

NAMELIST /MODE/MICRO,ISTR1,IEND1,ISTR2,IEND2,ISTR3,IEND3,  
ISTR4,IEND4,ISTR5,IEND5,ISTR6,IEND6,ISTR7,IEND7

CONT. ON PG 2

PG 1 OF 15

002

NAMLIST /USRSC/DPHI,FE,TSWALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T,  
PHIRX,PHIRY,PHIRZ,PDOTX,PDOTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY,  
PDOTRZ,OMEOS,OMEGA,PJ,XNN,K,MANY,IPANAN,EPI,AX,AY,AZ,  
EA,EANT,ALPHA,TL,TACCEL,XNN,TMOLO,POOTAV,POOTST,PHIFOV

NAMLIST /USRAP/CLIFE  
NAMLIST /USRDP/BTRAX,SCSFL,TPRFL,OPSHS,ARRAYN,MISPD,NMSEQ

NAMLIST /USRCM/IOPTW,IMSSEP,LSOLS,LSUB,FREQ,APDQEE,NET,NADIR,  
FREQ,COMRAT,BNIDTM

NAMLIST /USREP/IVOLT,OPTEMP  
NAMLIST /USRTH/ISATOR,ORBINC  
NAMLIST /USRRE/KEOPT,SYSLB,RFIXED,SLBMX,ISPT,SPEC,SPEC1,ISUB  
NAMLIST /USRCS/NFV,NOV,XMR,XREQ,FEEPCT,INETYP

NAMLIST /USRVS/EQPF,MD12SH,EQM1XL,EQM1YL,EQM1ZL,EQM2XL,EQM2YL,  
EQM2ZL,ISBOFG,NUMREQ,EEQWT,EEQVL,EM1YCG,EM1ZCG,EM2YCG,  
EM2ZCG,CGEEX,EELOC,XCOSAI,XCOSB

NAMLIST /USRSK/SKORE  
NAMLIST /USRST/CA,CE  
NAMLIST /USRI/EQMIWT,EQM2WT,DIAMAX,ALT  
DATA NEQUIP,NACCEP/60/

DATA ISTR1,IEND1,ISTR2,IEND2,ISTR3,IEND3,ISTR4,IEND4,ISTR5,  
IEND5,ISTR6,IEND6,ISTR7,IEND7/1.5.1.3.1.2.1.5.1.6.1.3.0.1/

DATA ITEST1,ITEST2,ITEST3,ITEST4,ITEST5/9.14.2.11.5/  
READ (5,MODE)  
READ (5,USRSC)  
READ (5,USRAP)  
READ (5,USRDP)  
READ (5,USRCM)  
READ (5,USREP)  
READ (5,USRVS)

READ (5,USRI)  
READ (5,USRTH)  
READ (5,USRRE)  
READ (5,USRSK)  
READ (5,USRST)  
READ (5,USRCS)  
ITNST=FE  
ISEQ=ISATOR

IREL=ISTR7  
ISAT=ISATOR

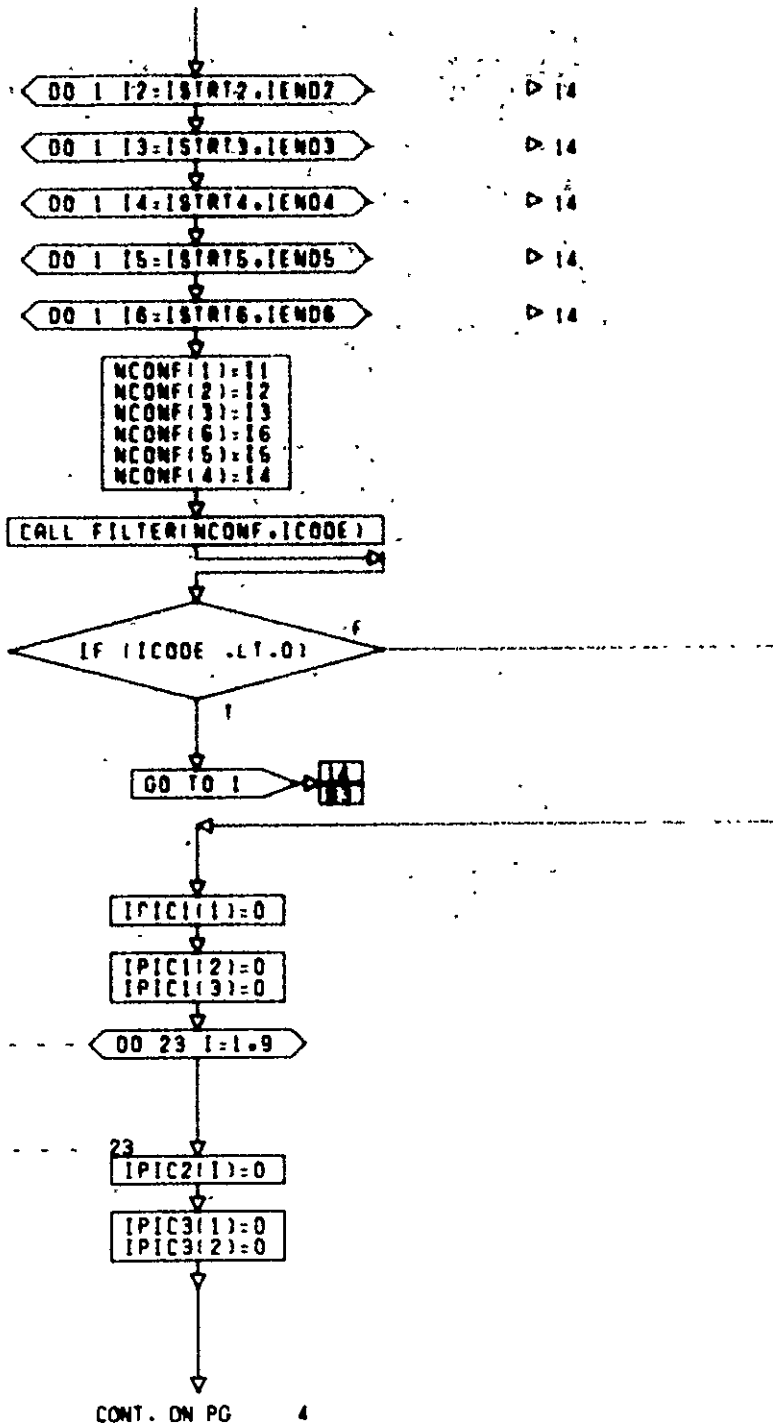
A1 15

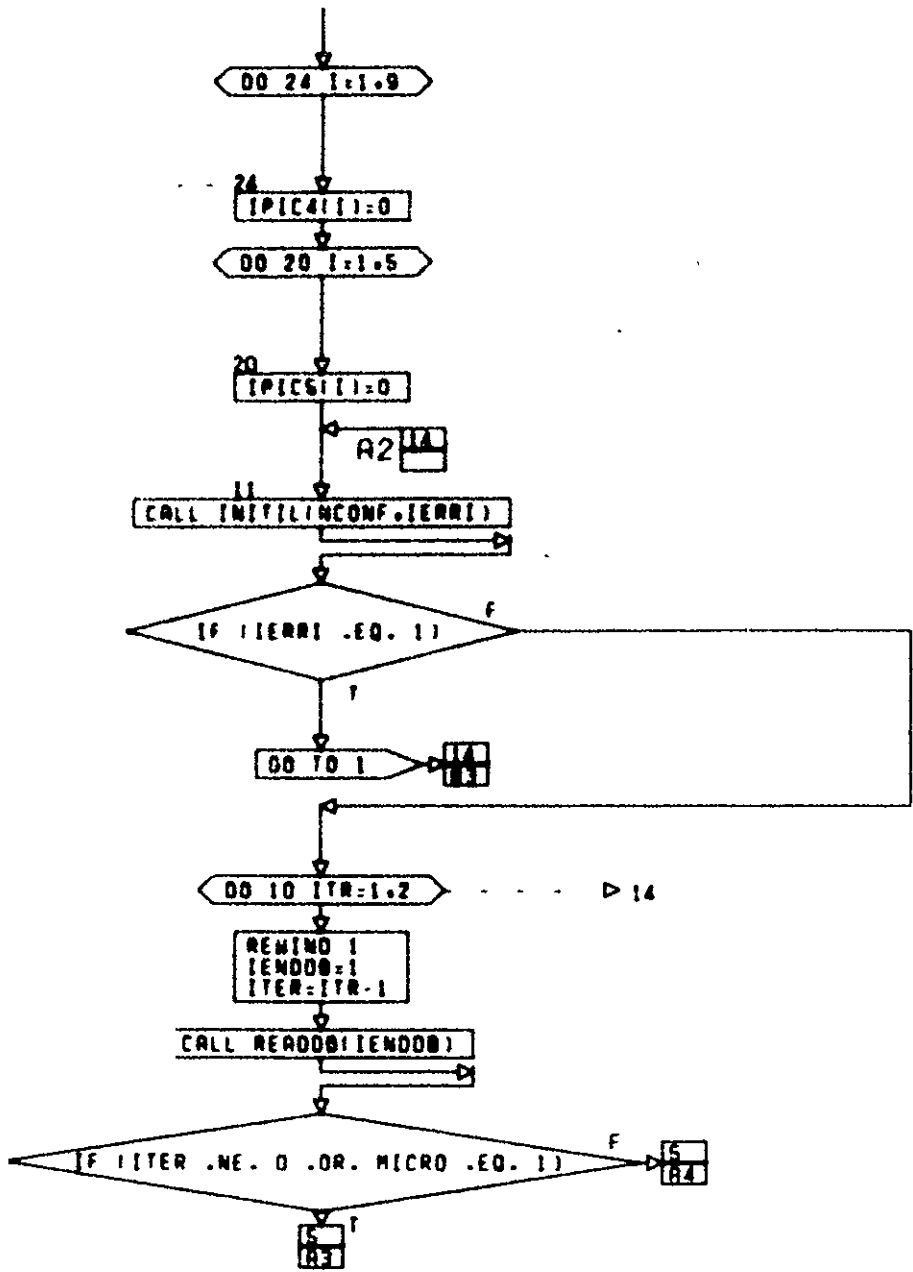
DO 1 I=ISTR1,IEND1

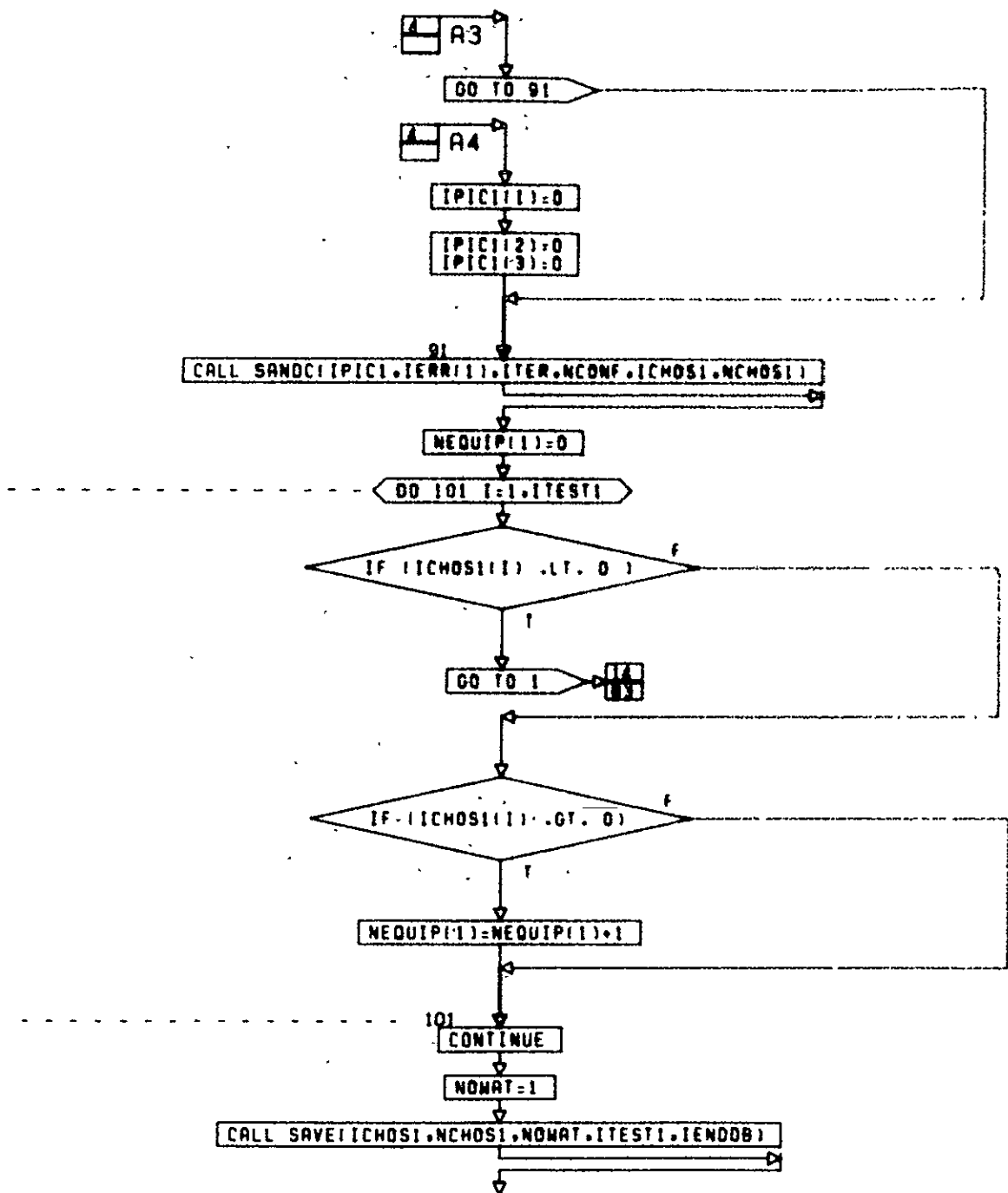
CONT. ON PG 3

PG 2 OF 15

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OF POOR QUALITY



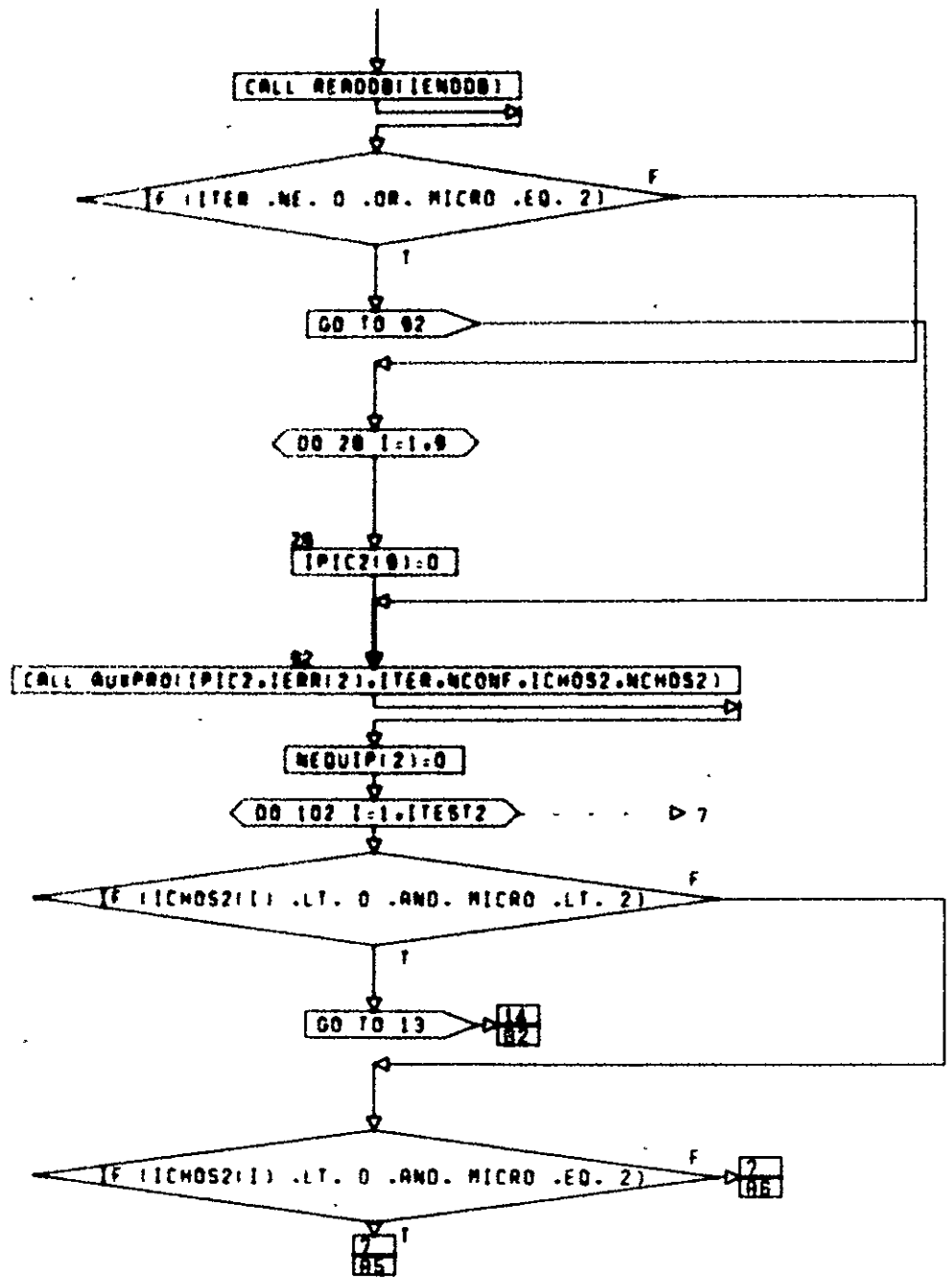




CONT. ON PG 6

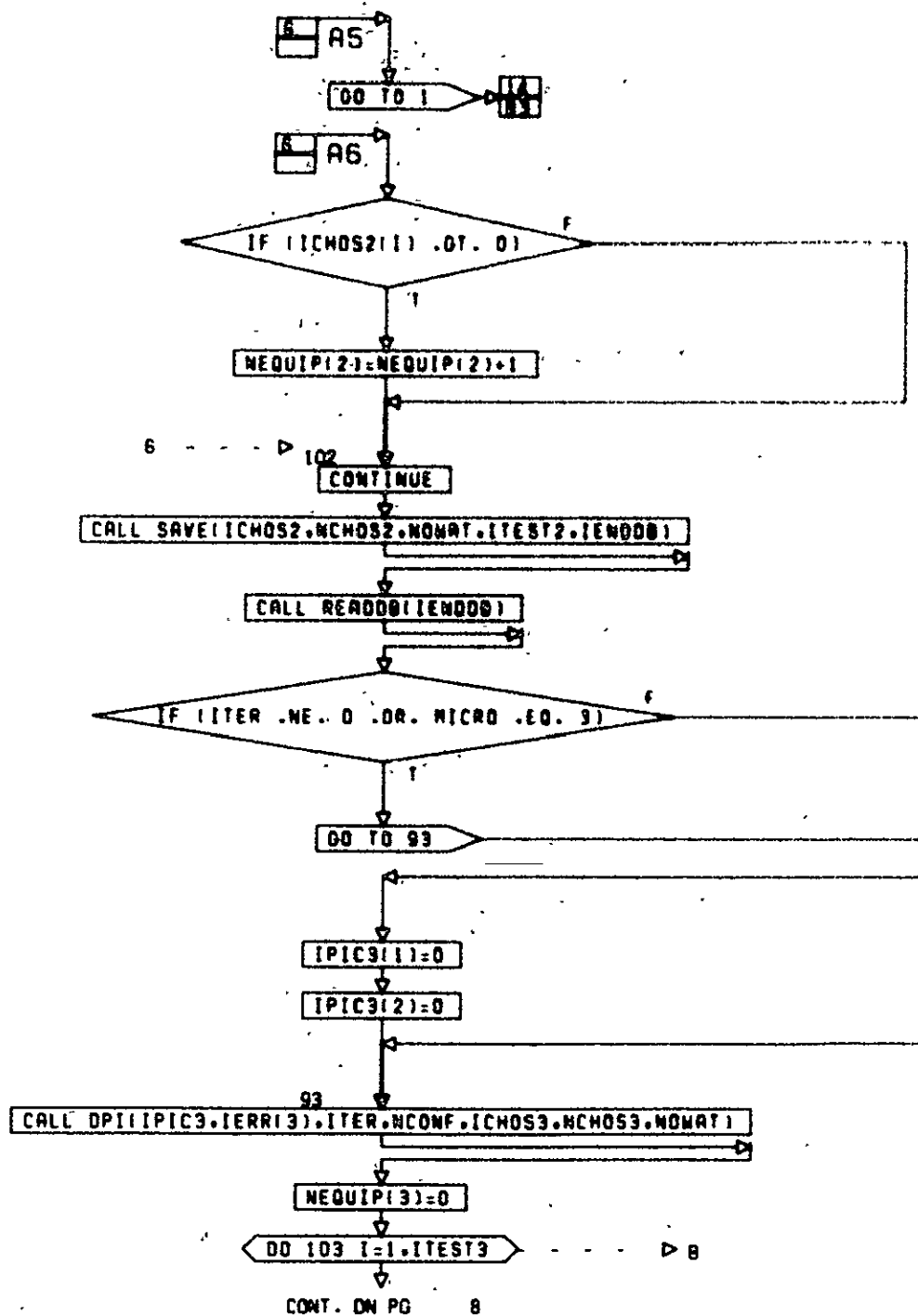
PG 5 OF 15

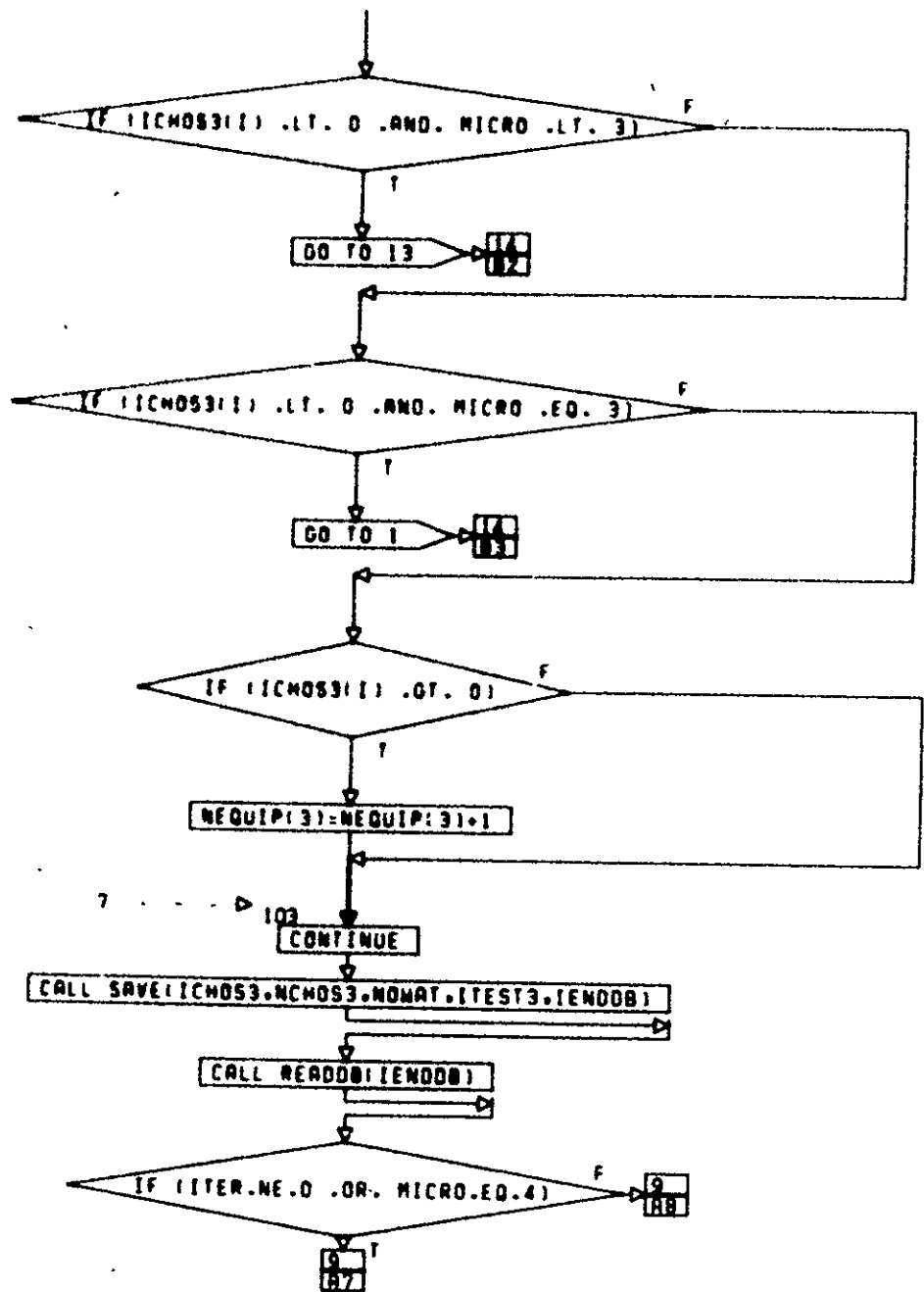
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CONT. ON PG 7

PG 6 OF 15

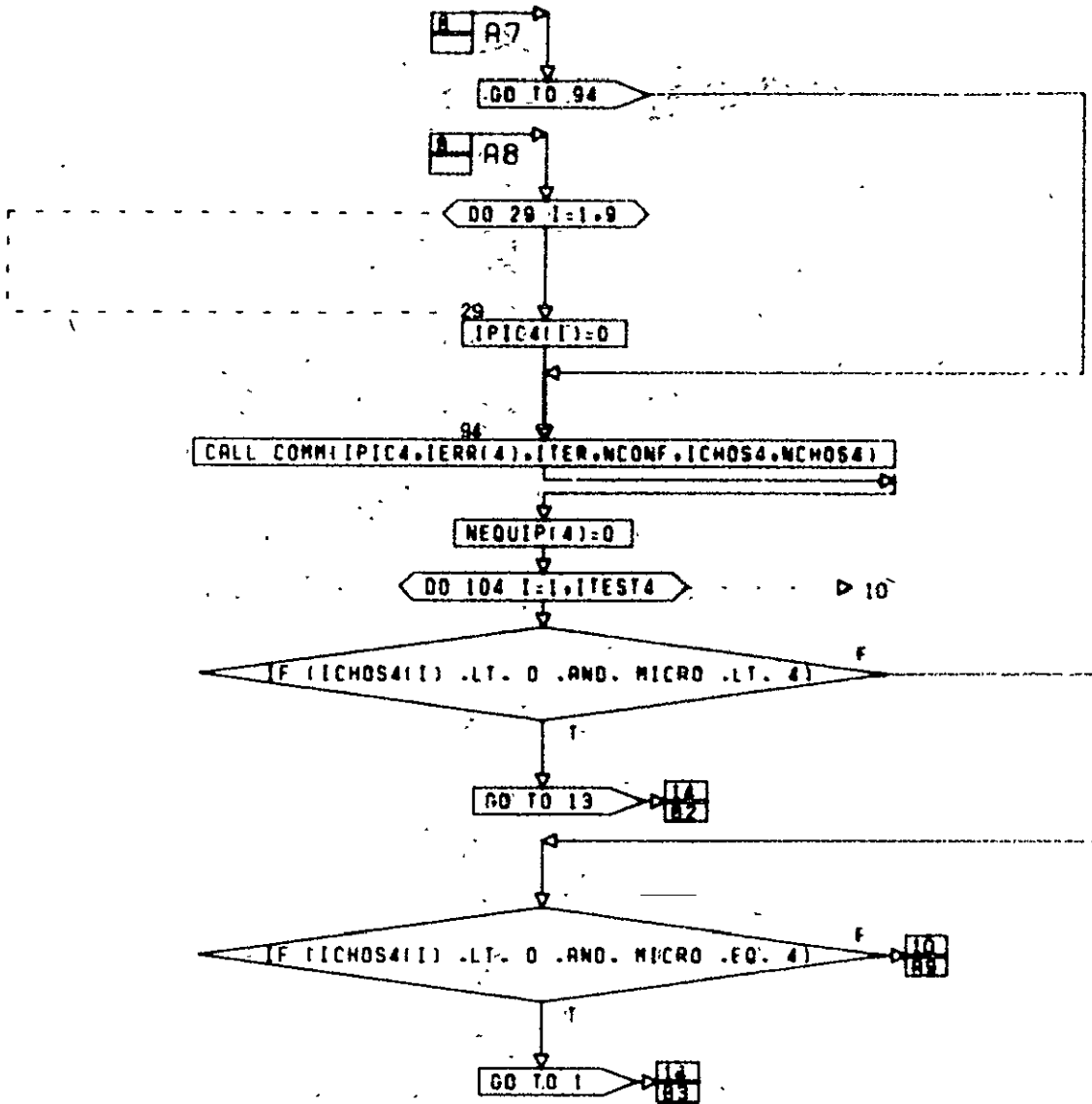




CONT. ON PG 9

PG 8 OF 15

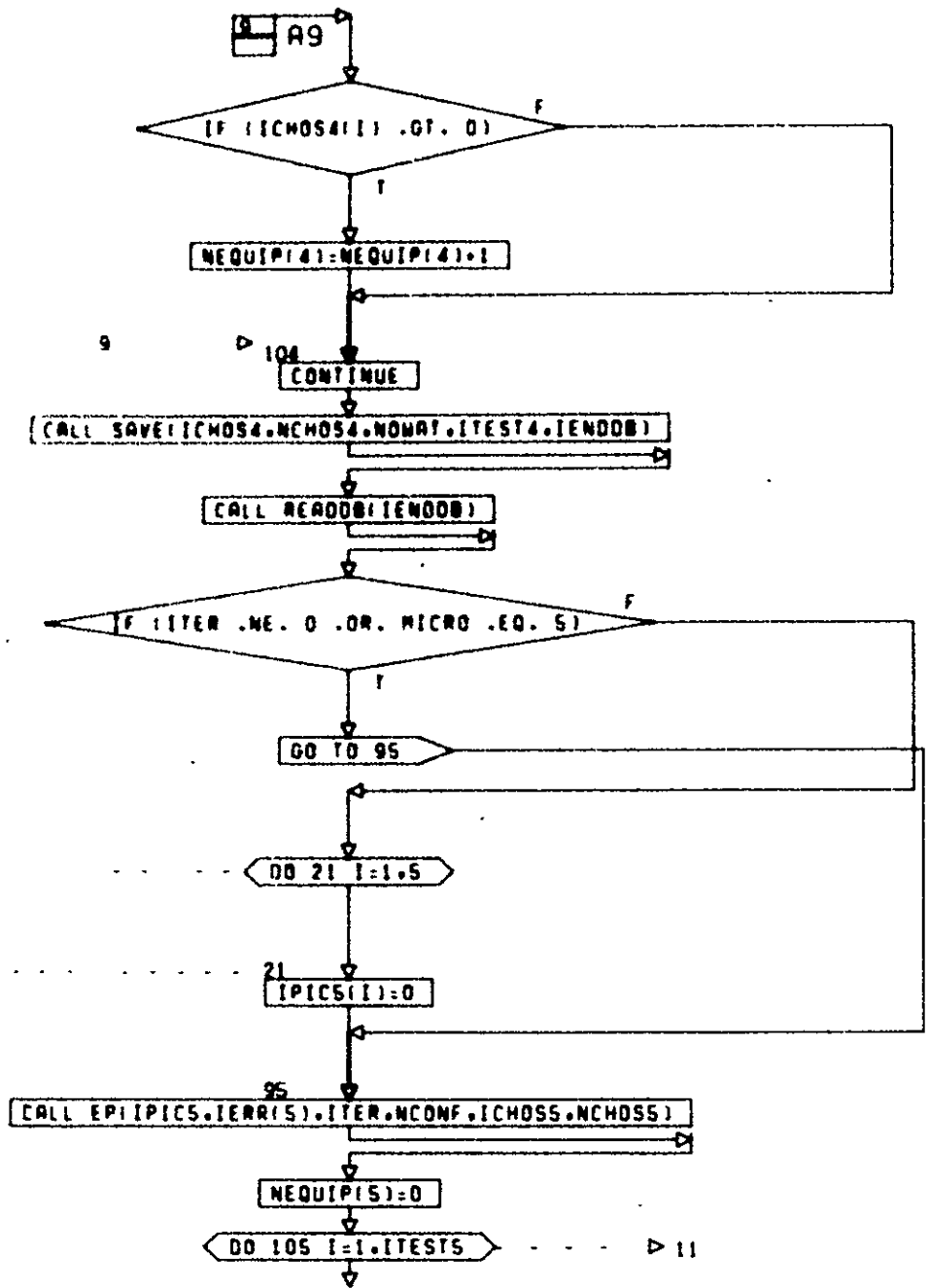




CONT. ON PG 10

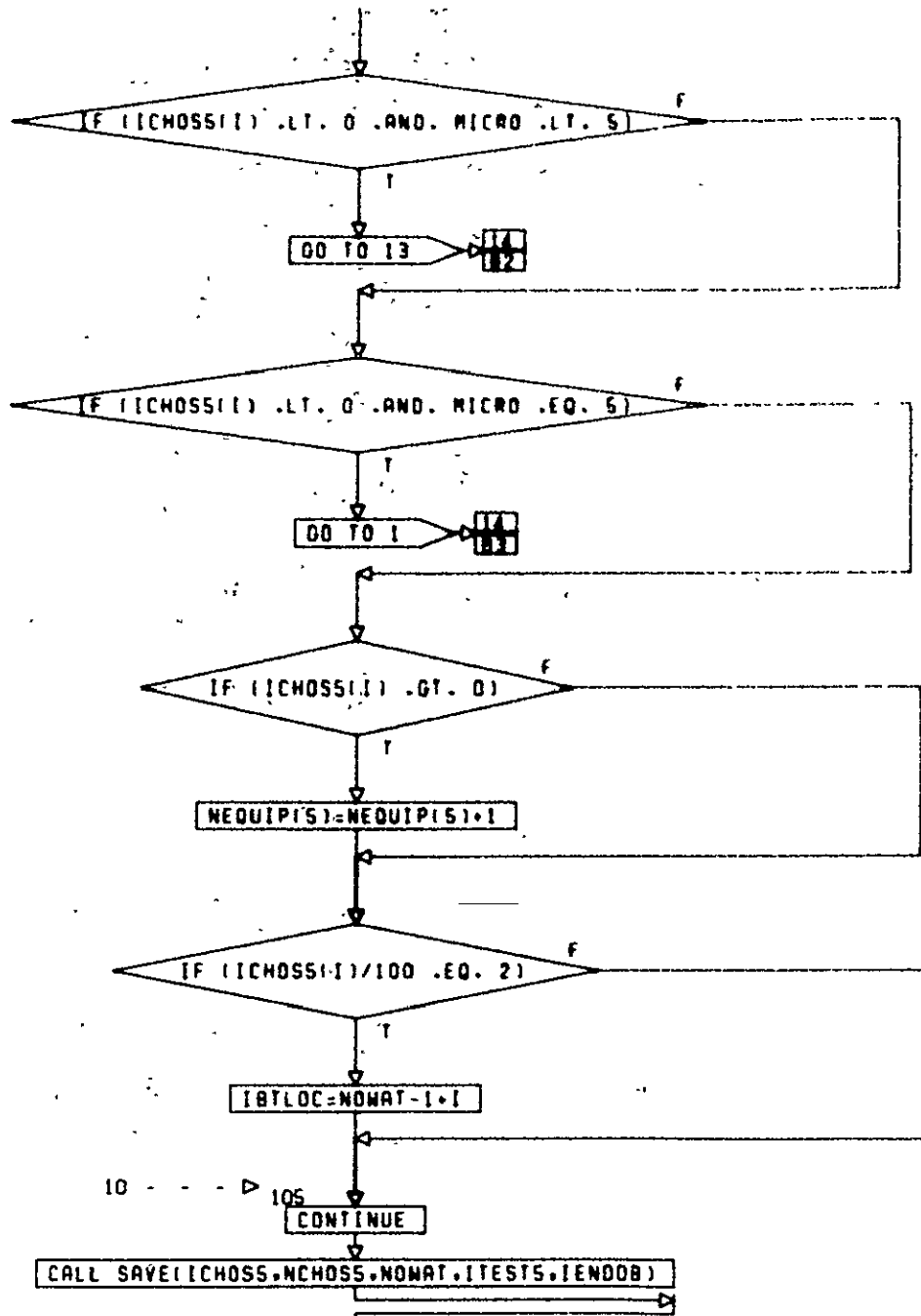
PG 9 OF 15

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CONT. ON PG 11

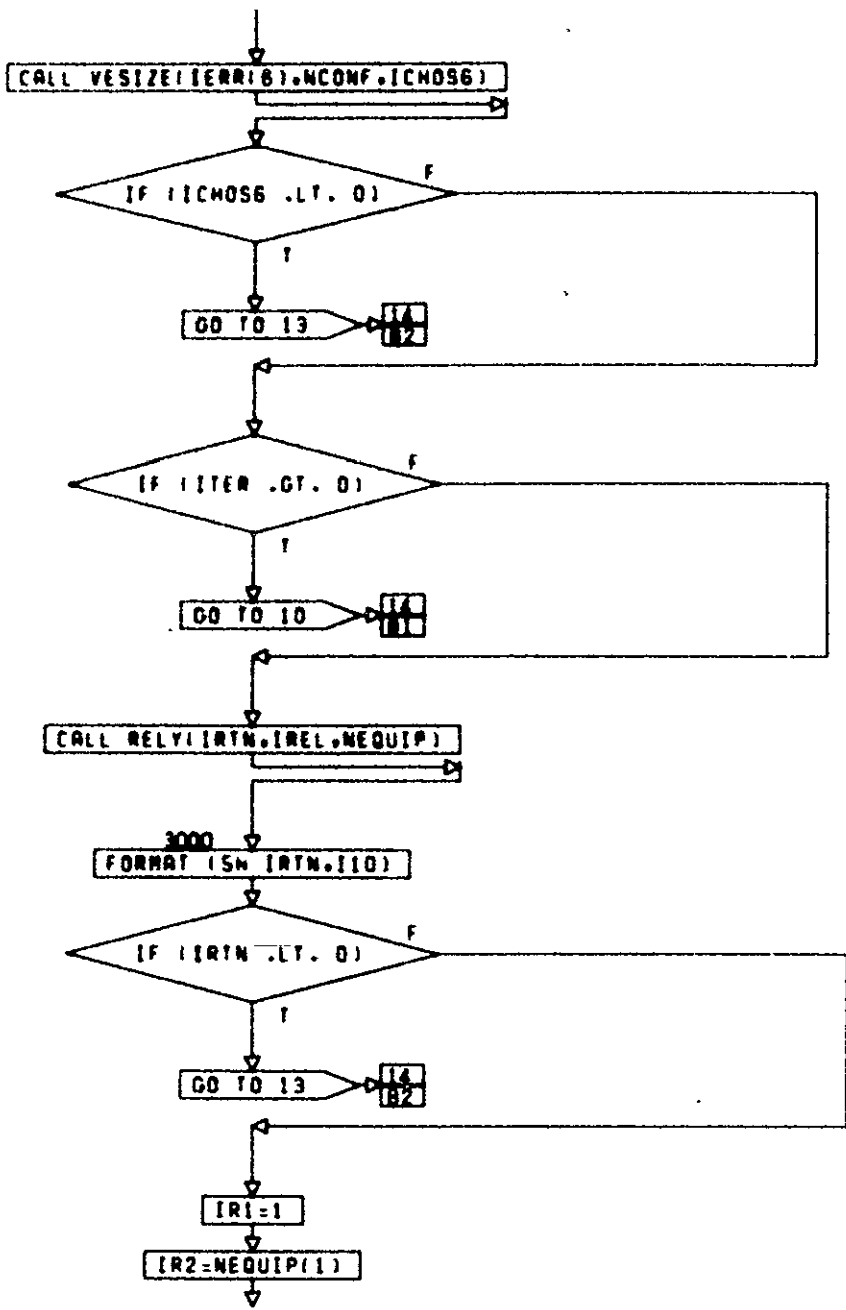
PG 10F 15



CONT. ON PG 12

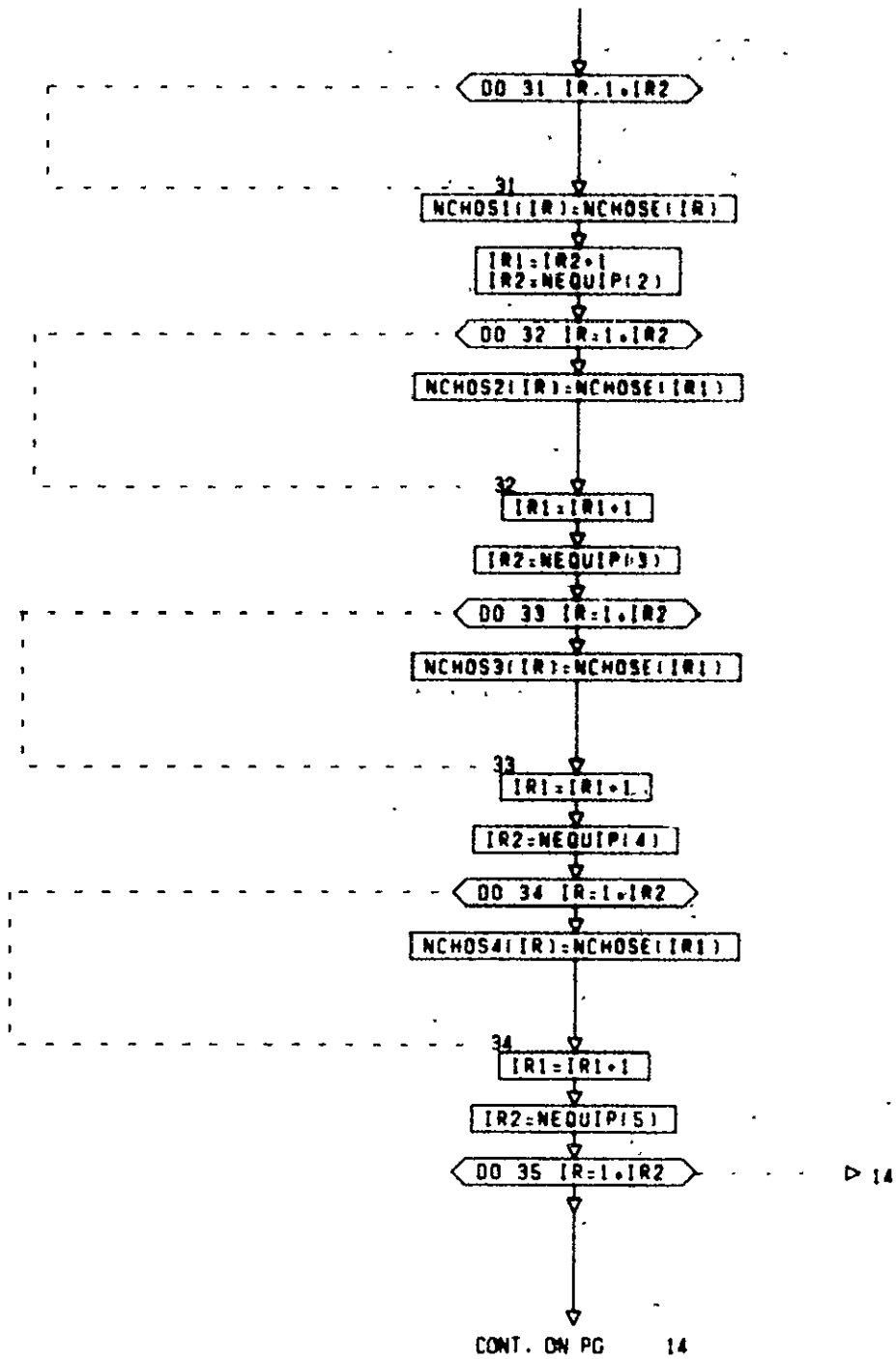
PG 1 OF 15

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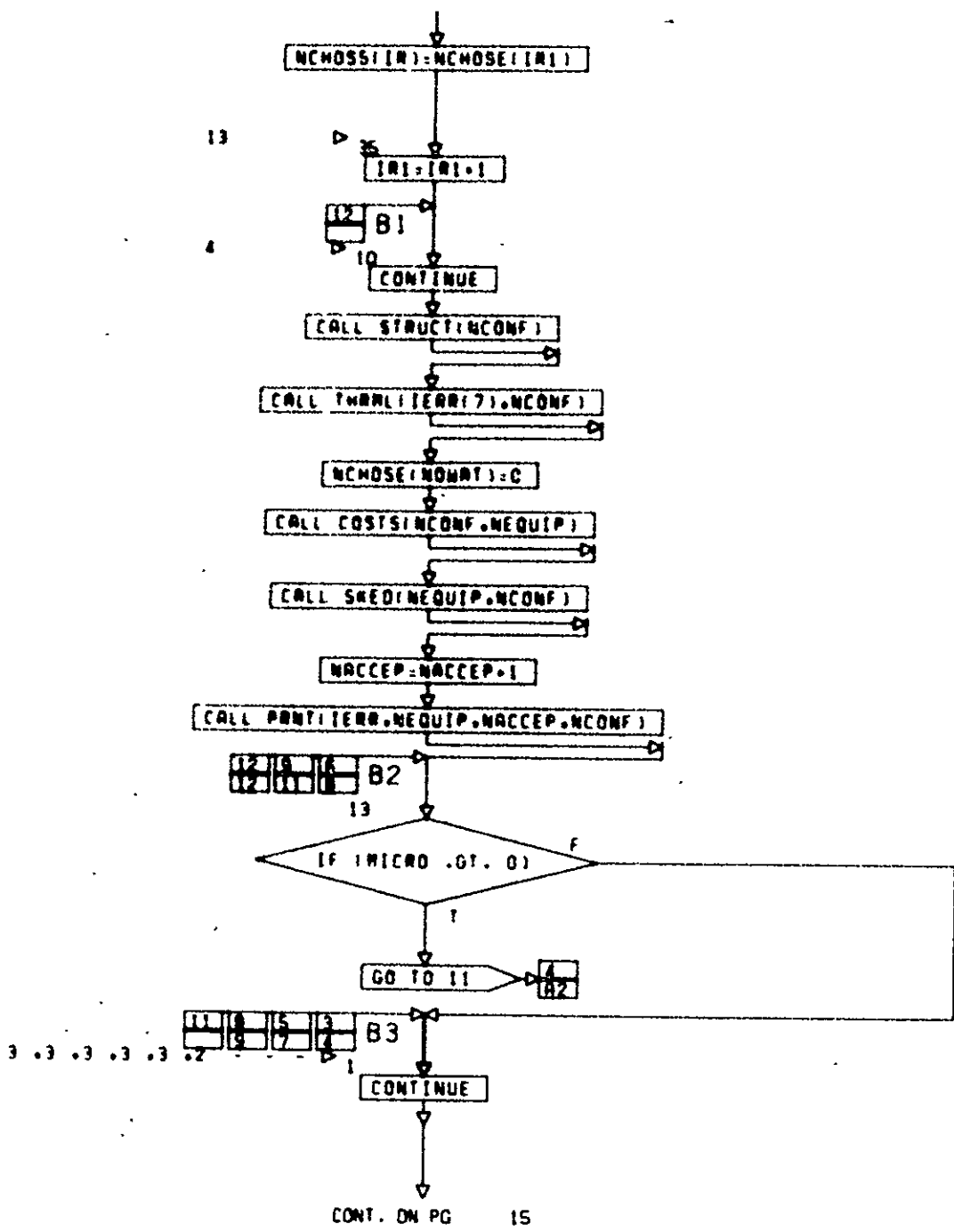
CONT. ON PG 13

PG 12F 15

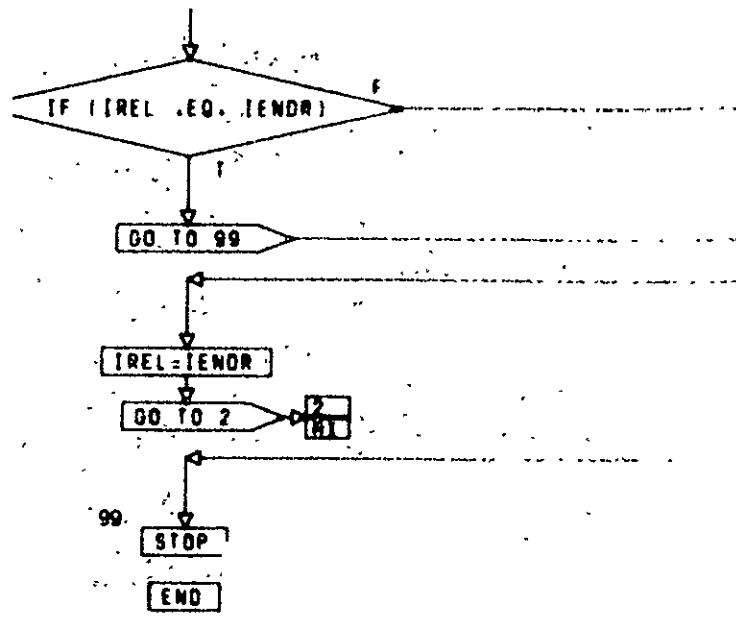


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CONT. ON PG 15



PG 15 FINCL

SUBROUTINE INITILINCONF, IERR)

C THIS SUBROUTINE SETS APPROXIMATIONS FOR ALL VALUES IN BTWN  
C WHICH ARE USED BEFORE THEY ARE CALCULATED

DIMENSION NCONF(6)

COMMON /USER1/DPHI,FE,TSMALL,XNU,PDDTD,TAUX,TAUY,TAUZ,T,  
PHIX,PHIY,PHIZ,PDDTX,PDDTY,PDDTZ,XN,YN,ZN,PDDTAX,PDDTAY,  
PDDTRZ,OMEDS,OMEDR,PJ,XNN,K,MANY,IPAYW,EPI,AX,AY,AZ,  
EA,EANT,ALPHR,TL,TACCEL,XNNW,THOLD,PDDTAY,PDDTST,PHIFOV,ISAT

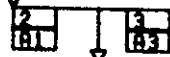
COMMON /USER1/ EQM1MT,EQM2MT,DIAMAX,ALT

COMMON /PRTCON/ACCRCY,CISTAR,IREL,AMDOLD,TRUNC,ITRUNC,DE,TE,  
TOOLR,QCR,SEIR,PAR,PE,PU,TOOLU,QCP,SEIP,PAP,SATR,SATINV,NER,  
MEINV,PAYR,PAYINV,PAYQUL,OSE,XLTOT,CTOT,FEER,FEEINV,ODTE,XVEST,  
OPS,SKTAUI(6),ROLD(60),TTT,AN,TS,BS,AN,TF,BF,TC,TA,TO,TOTOPS

COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TL,PL,PLAIN,  
LMBDD,ARER,SATLG,MATE,NC,ACSWP,HARMNT,TMCMNT,CONVNT,TMKNMT,PASSTR,  
SATMT,TPRIN,IBTLOC,RADA,RADAB,RAT,HTRPNR,HTPRB,  
HPT,HTPIPE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2),  
EQBLG,SABDLG,SATMT

IERR=0  
ACCRCY=AMIN(1,PHIX,PHIY,PHIZ)  
EQM1MT=EQM1MT+EQM2MT  
SATMT=36.9\*EQM1MT\*\*0.672  
EQBVOL=.1\*SATMT  
TPRIN=7  
N=NCONF(6)

GO TO (20,10,30),N



C HERE IF A BOX

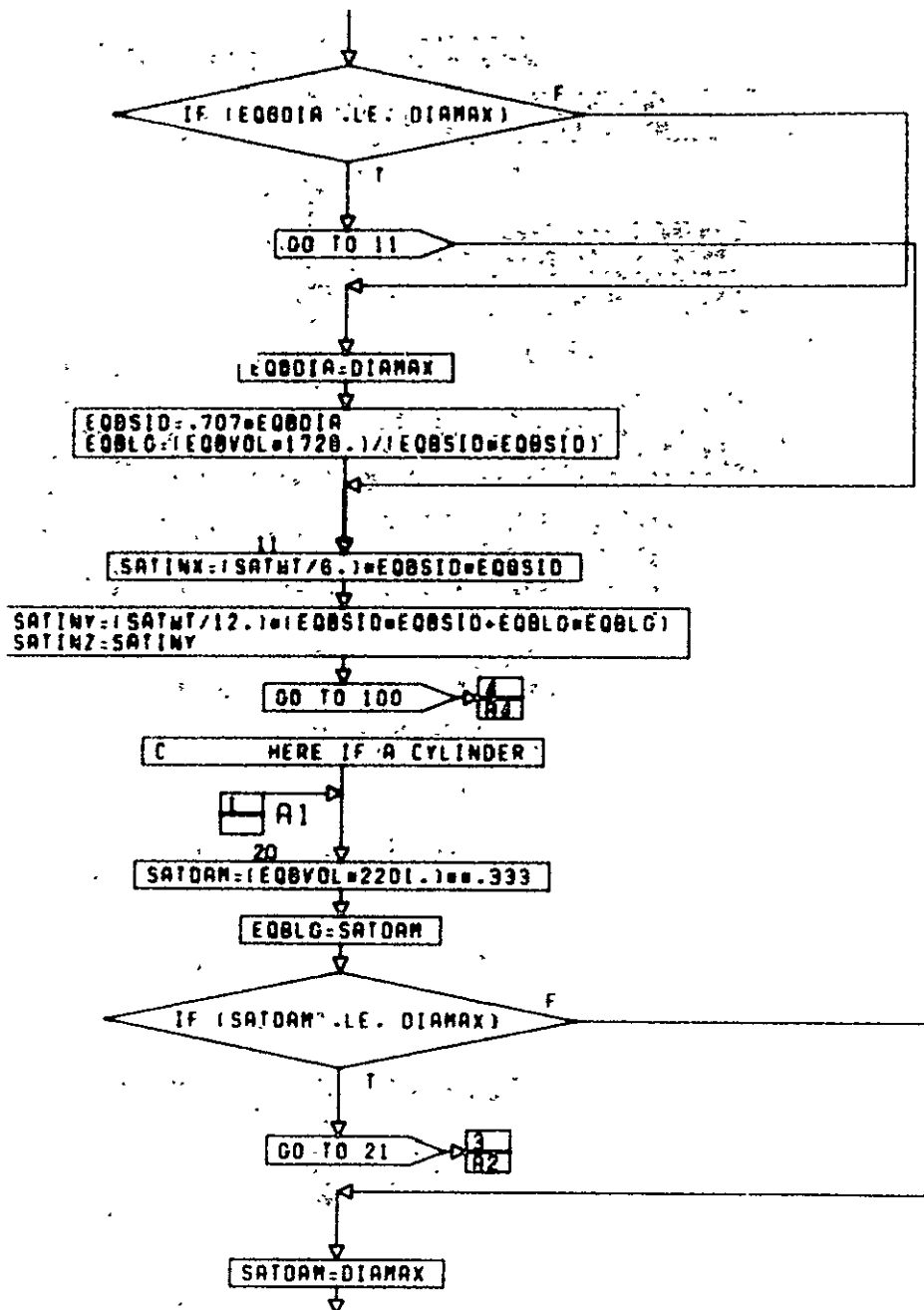
EQBLG=(EQBVOL\*\*3456.)\*\*0.333

EQBDIA=EQBLG  
EQBSID=.707\*EQBDIA

CONT. ON PG 2

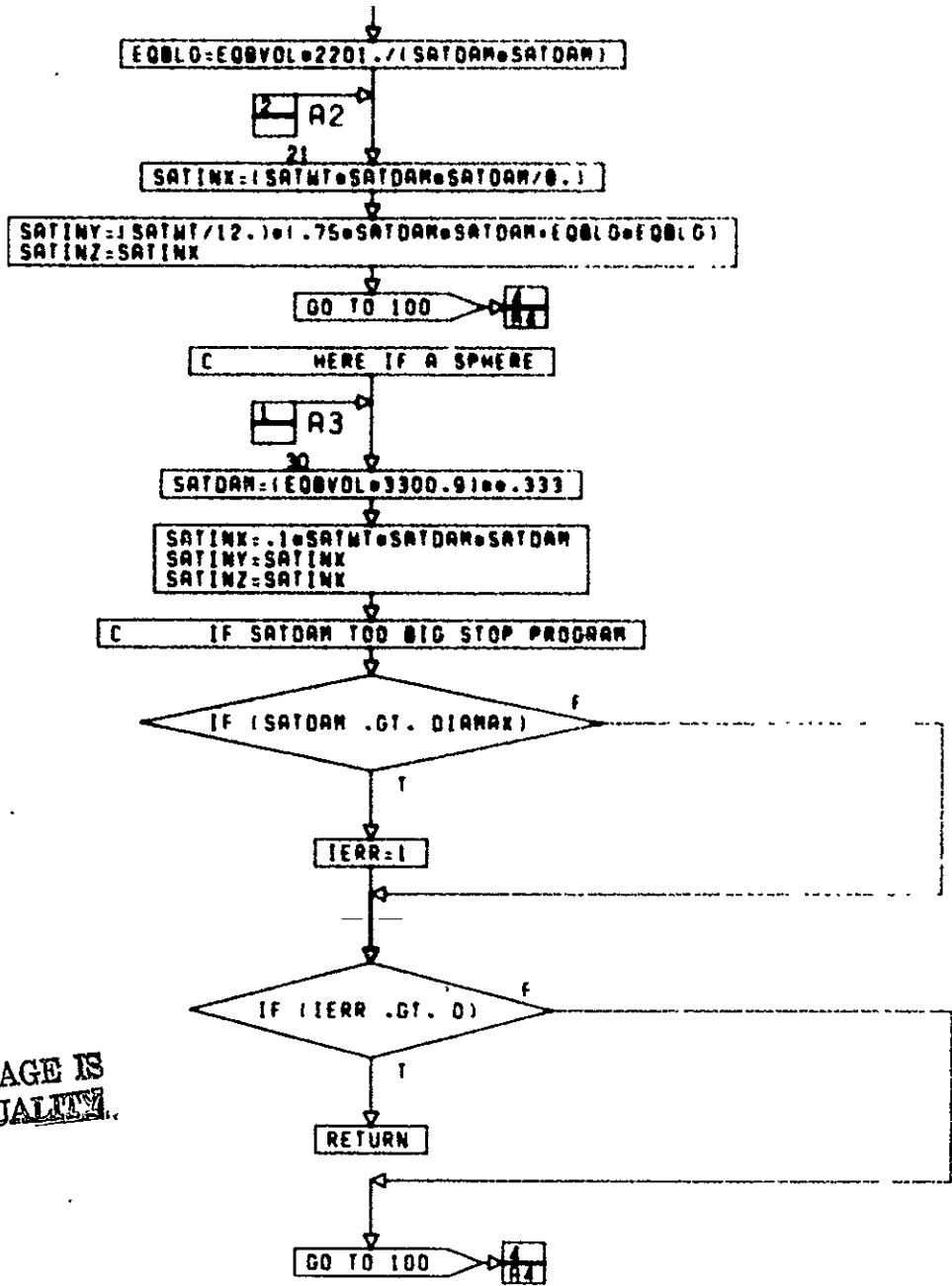
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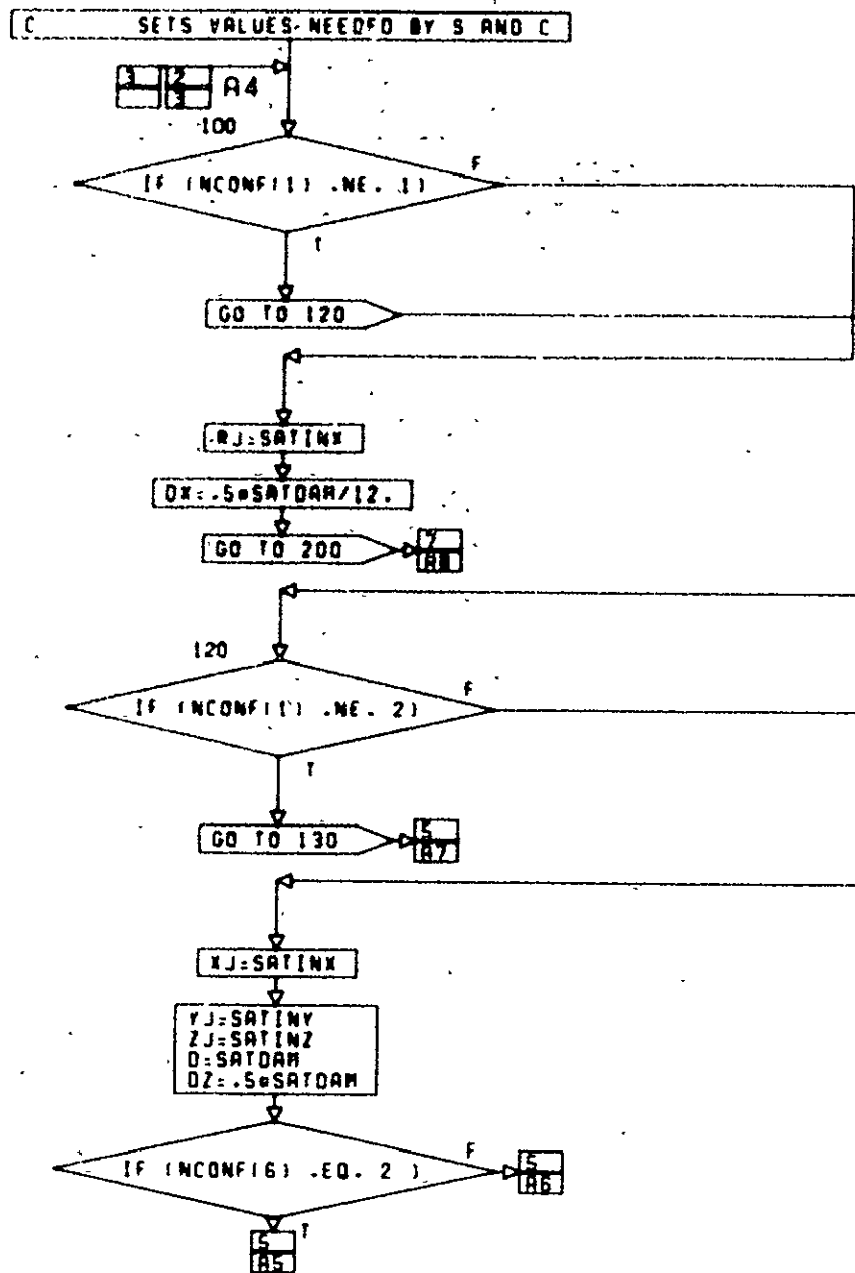


CONT. ON PG 3

PG 2 OF 7

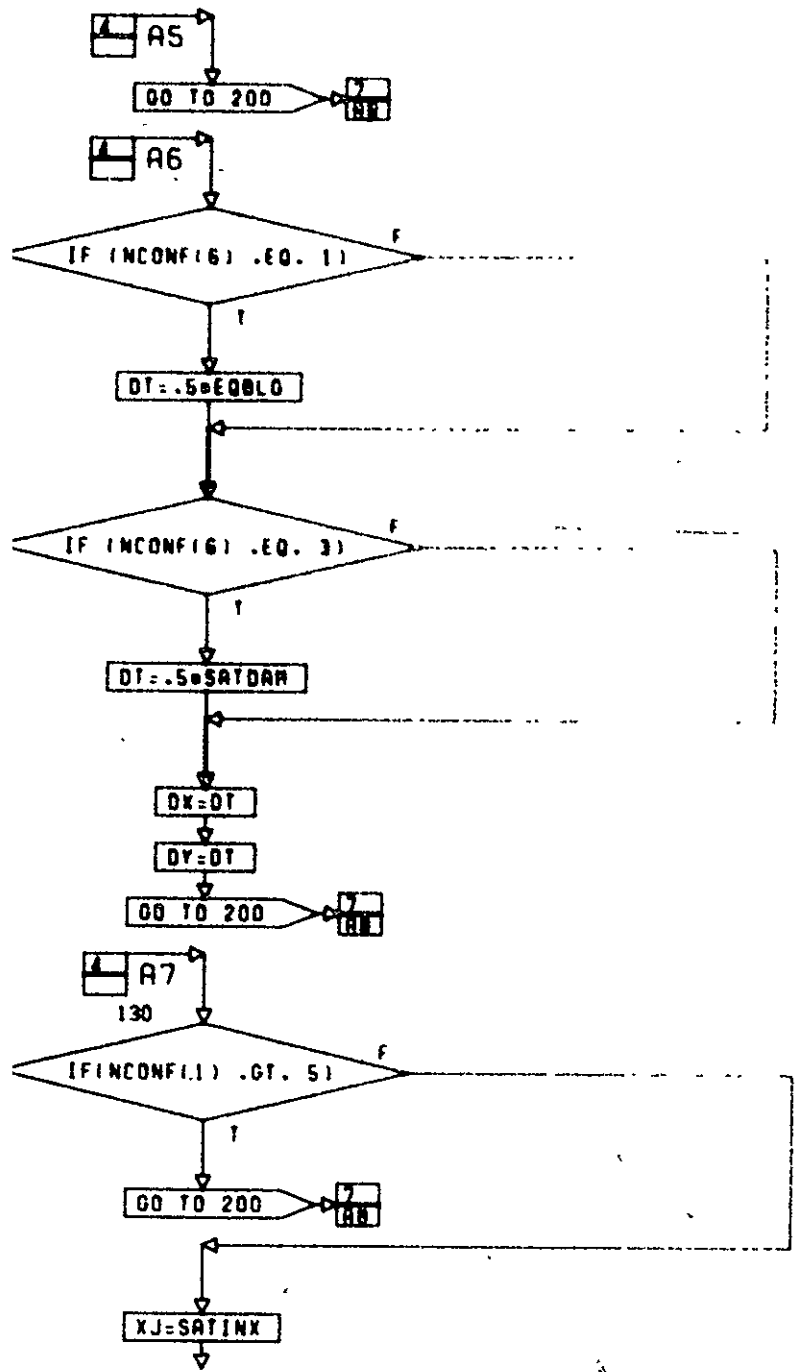


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OF POOR QUALITY.



CONT. ON PG 5

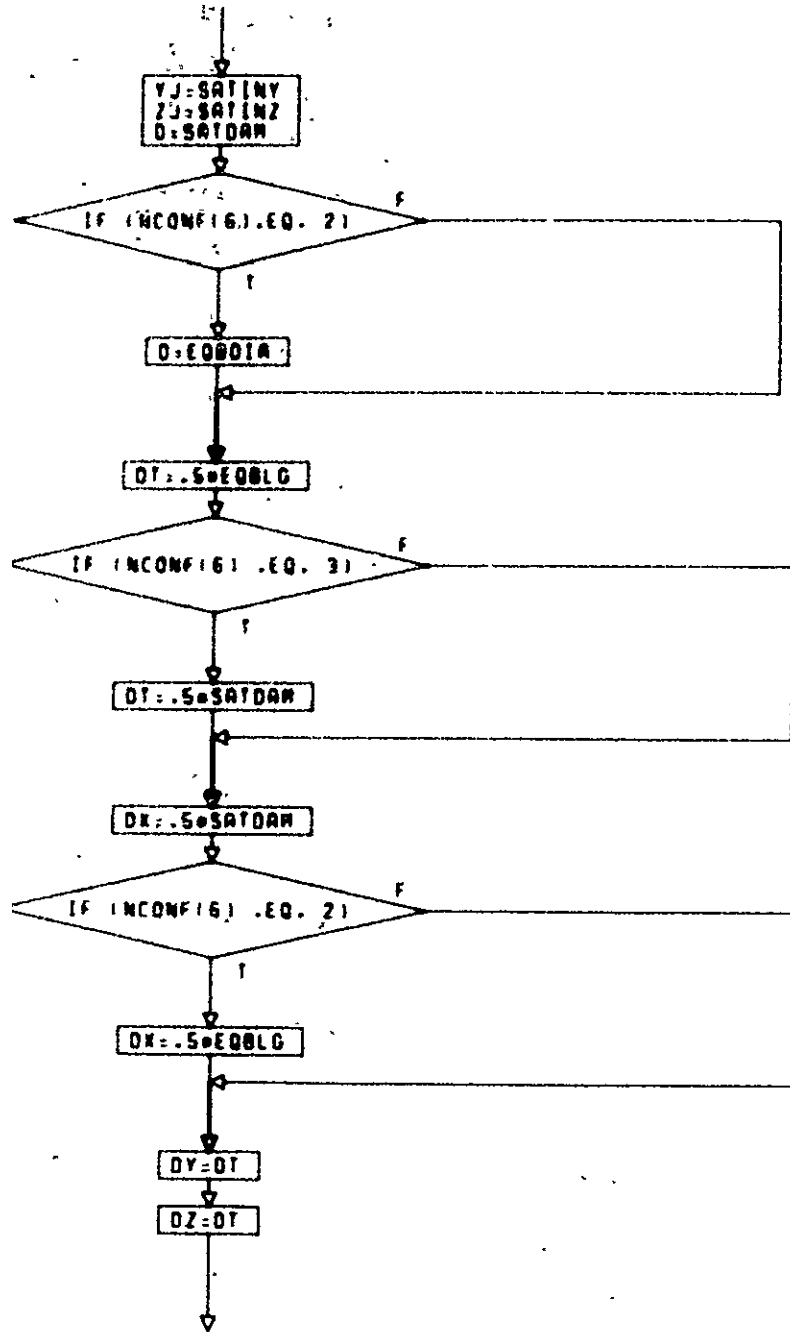
PG 4 OF 7



CONT. ON PG 6

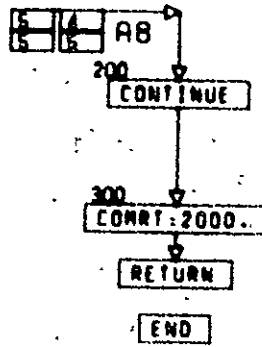
PG 5 OF 7

013



CONT. ON PG 7

PG 6 OF 7



PG 7 FINL

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BLOCK DATA

C SETS ALL DEFAULT VALUES

COMMON /USER1/DPHI,FE,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T,  
PHIRX,PHIRY,PHIRZ,PDOTX,PDOTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY,  
PDOTRZ,OMECS,OMEGR,PJ,XNN,K,MANY,IPAYAW,EPI,AX,AY,AZ,  
EA,EANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV,ISAT

COMMON /USER2/TTNST,CLIFE  
COMMON /USER3/BTRMX,SCSFL,TPRFL,OPSMS,ARRAYN(1,3),NMSEQ

COMMON /USER4/IOPTCM(3),IMSSEP,ISEQ,LSGLS,LUSB,FREQ(2),APOGEE,NET,  
NADIR,FREQR,COMRAT,BWIDTH(2)

COMMON /USER5/IVOLT,OPTEMP

COMMON /USER6/EQPF,M812ZH,EQM1XL,EQM1YL,EQM1ZL,EQM2XL,EQM2YL,  
EQM2ZL,ISBDFC,NUMEEO,EEQNT(9),EEQYL(9),EM1YCO,EM1ZCO,EM2YCO,  
EM2ZCO,CCEEX(9),EELDC(9),XCOSA1,XCOSA3

COMMON /USER7/ISATOR,ORBINC  
COMMON /USER8/SKOME(7,3)  
COMMON /USER1/EQM1WT,EQM2WT,QIAMAX,ALT  
COMMON /USERA/KEOPT,SYSLB,RFIXED,SLBHX,ISPT,SPEC(6),SPECI,ISUB  
COMMON /USERC/NFV,NQV,XMER,XMEU,FEPC,INETY

DATA DPHI,FE,TSMALL,XNU,PDOTO,TAUX,TAUY,TAUZ,T/.25,4,1,100.,  
3.,1.,3#62208000.,24./

COMMON /USER9/CA,CE

DATA PHIRX,PHIRY,PHIRZ,PDOTX,PDOTY,PDOTZ,XN,YN,ZN,PDOTRX,PDOTRY,  
PDOTRZ/3#.75,6#1.,3#.012/

DATA OMECS,OMEGR,PJ,XNN,K,MANY,IPAYAW/1,5708,60.,75.,21.,1,1,0/  
DATA EPI,AX,AY,AZ/.0001,3#.05/

DATA EA,EANT,ALPHA,TL,TACCEL,XNNN,THOLD,PDOTAV,PDOTST,PHIFOV  
/.1.,1.,12.,1.,20.,4.,10000.,.01.,.0667,40./

DATA CLIFE/50000./

DATA BTRMX,SCSFL,TPRFL,OPSMS,ARRAYN,NMSEQ/1024000.,36#0.,  
0/

DATA IVOLT,OPTEMP/0,15./

DATA IOPTCM,IMSSEP,LSGLS,LUSB,FREQ,APOGEE,NET,NADIR,FREQR,COMRAT,  
BWIDTH/0,0,0,0,1,0,2#2250.,500.,0,0,1800.,1000.,2#-1.E10/

CONT. ON PG 2

PG 1 OF 2

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OF POOR QUALITY

DATA EQPF.MB1ZZM.EQM1XL.EQM1YL.EQM1ZL.EQM2XL.EQM2YL/2..1.  
5#40./

DATA EQM2ZL.ISOOFD.NUMEEQ.EEQMT.EEQVL.EM1YCO.EM1ZCO.EM2YCO  
/40..2#0.2#0./

DATA EM2ZCO.COEEK.EELOK.XCOSA1.XCOSA3 /0..9#2..9#3..2#1./  
DATA ISATOR.ORBINC/1.2#0.5/  
DATA SKONE/2#0./  
DATA CA.CE/10..5./  
DATA EQM1T.EQM2T.DIAMAX.ALT/2#435..120..500./

DATA KEOPT.SYSLB.FIXED.SLBNX.ISPT.SPEC.SPECT.ISUB/1.0..  
1..50000..0.5#9..6.18..0/

DATA NFV.NOV.XNER.XNEU.FEEPCT.IMETYP/4.1.0..0..07.2/

END

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PG 2 FINAL



SUBROUTINE COSTS (NCONF,NEQUIP)

C \*\*\*\*\*  
 C \*\* THIS SUBROUTINE COLLECTS COSTS FOR CATALOG ITEMS AND CALCULATES \*\*  
 C \*\* COSTS FOR CER ITEMS AND STORES THEM FOR OUTPUTTING \*\*  
 C \*\*\*\*\*

COMMON /BTWN/ WT,VOL,DT,D,OX,OY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLIN,  
 LMOO,AREA,SATLO,MATE,NC,ACSM,WARNT,IMCMT,CONVT,  
 INKNT,PASSTR,SATNT,IPRM,ISTLOC,RADA,RADAB,SAT,  
 HTRPR,HTRPRB,HPT,HTPIE,VCHP,HTPT,FC,KWZERD,COMT,  
 ACSSN,BITRAT(2),EQOLO,SABLO,SATNT

COMMON /CHOSE/[CHOSE(60),NCHOSE(60),COST(6,60),REL(6,60),TWR(4,60),  
 DPIA(11,60)]

COMMON /PRTCOM/ACCRCY,CISTAR,IREL,MDOLO,TRUNC,ITRUNC,DE,TE,TOOLR,  
 QCR,SEIR,PMR,PE,PU,TOOLU,OCU,SEIP,PMR,SATA,SATIN,  
 XNER,XNEIN,PAYR,PAYIN,PAYOU,OSE,XLTOT,CTOT,FEER,  
 FEEIN,DDTE,XVEST,OPS,SKTRV(6),ROLD(60),T,AN,TS,OS,  
 AR,IF,BF,TC,TA,TB,TOTPS

COMMON /USERC/NFV,NGV,XNER,XNEU,FEEPCT,INETYP

DIMENSION RE(6),RT(6),RP(6),BE(6),BT(6),BP(6),UPS(6),  
 XI(6),FR(6),FP(6),FT(6),FE(6),NCONF(6),NEQUIP(5),  
 COMPRI(60),COMPU(60),SUBE(7),SUBT(7),SUBR(7),  
 SUBUE(7),SUBUPI(7),SUBU(7),COMPSE(60),COMPSP(60),  
 SUBSP(7),SUBSE(7)

DATA	FR	/6=1./.
	FP	/6=1./.
	FT	/6=1./.
	FE	/6=1./.
	RE	/6000..105603..40500..53700..21630..
		10800./.
	RT	/1300..98719..25600..43100..11762..40200./
	RP	/2300..5882..3900..23900..67408..32400./.

	BE	/.4005..3334..4005..8156..585..4005/.
	BT	/.4005..2869..4005..7137..678..4005/.
	BP	/.3334..6960..3334..6781..5460..3334/.
	PI	/1./.
	SF	/1./

SEIR = 0.  
 QCR = 0.  
 PMR = 0.  
 SUMTDE = 0.  
 TODLR = 0.  
 SEIP = 0.  
 OCU = 0.  
 PMP = 0.

SUMPE = 0.

CONT. ON PG 2

TOTSUM = 0.  
SATR = 0.  
SATINV = 0.  
REINV = 0.  
PAYR = 0.  
PAYINV = 0.  
PAYOUL = 0.

GSE = 0.  
XLTOT = 0.  
CTOT = 0.  
FEER = 0.  
FEEINV = 0.  
ODTE = 0.  
RVEST = 0.  
OPS = 0.

DE = 0.  
TE = 0.  
PE = 0.  
PU = 0.  
SYSR = 0.  
SYSU = 0.  
OS = 0.  
PSP = 0.

PSE = 0.

DO 1 I=1.7

SUBSP(I) = 0.  
SUBSE(I) = 0.  
SUBE(I) = 0.  
SUBT(I) = 0.  
SUBRI(I) = 0.  
SUBUE(I) = 0.  
SUBUP(I) = 0.

SUBU(I) = 0.

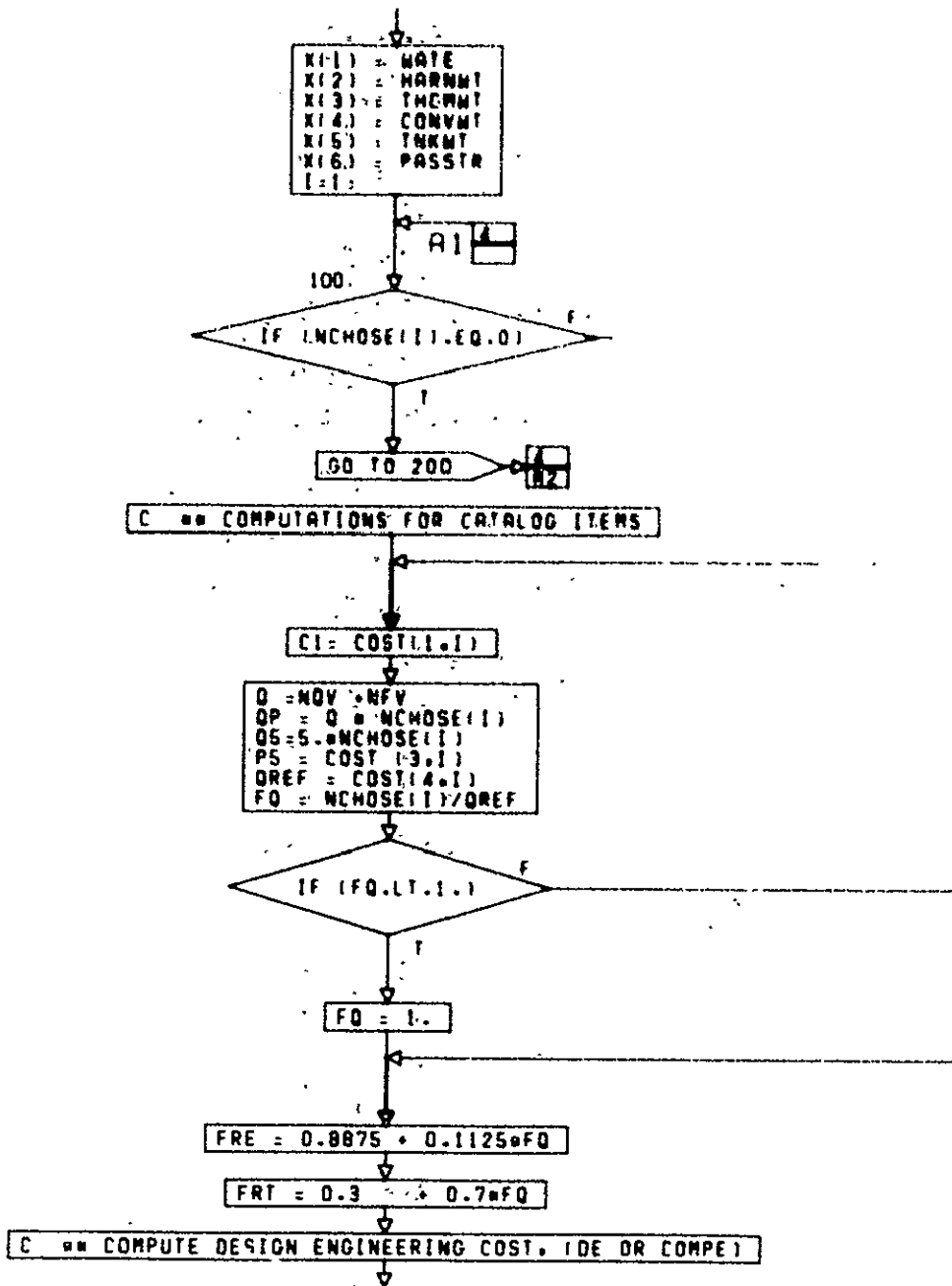
DO 2 I=1.60

COMPU(I) = 0.

COMPR(I) = 0.

CONT. ON PG 3

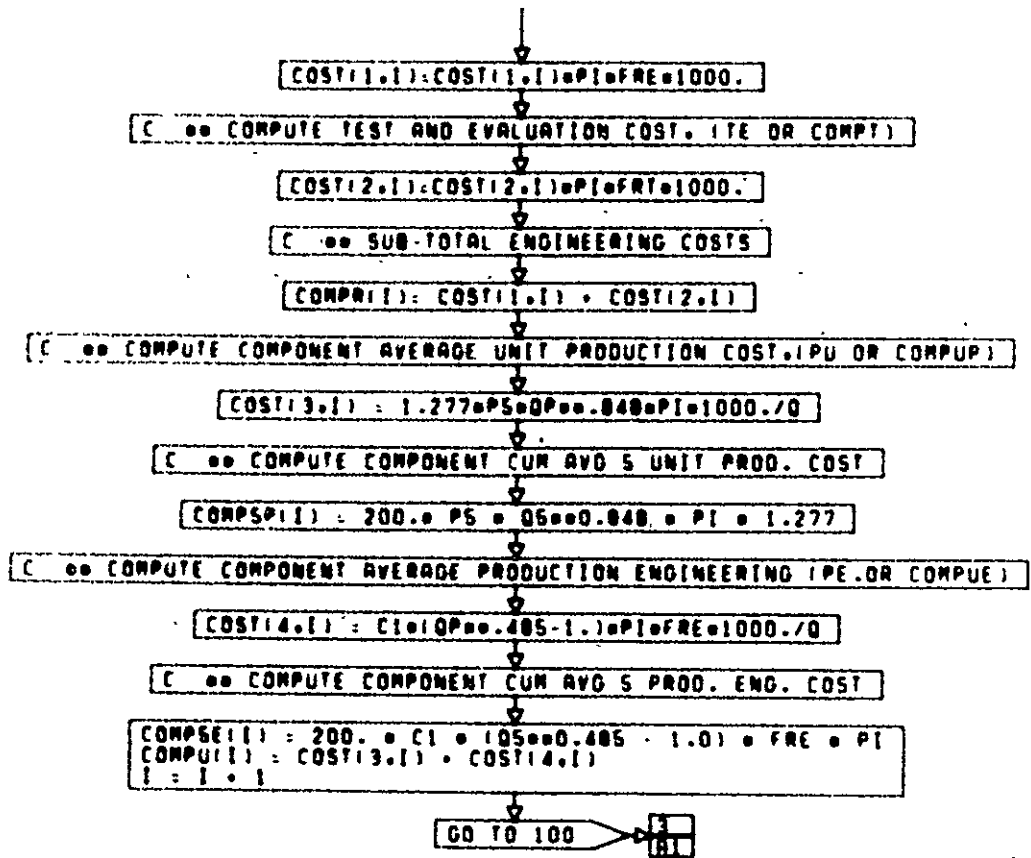
PG 2 OF 14



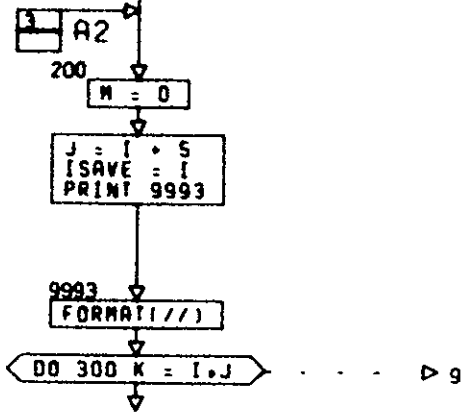
CONT. ON PG 4

PG 3 OF 14

019

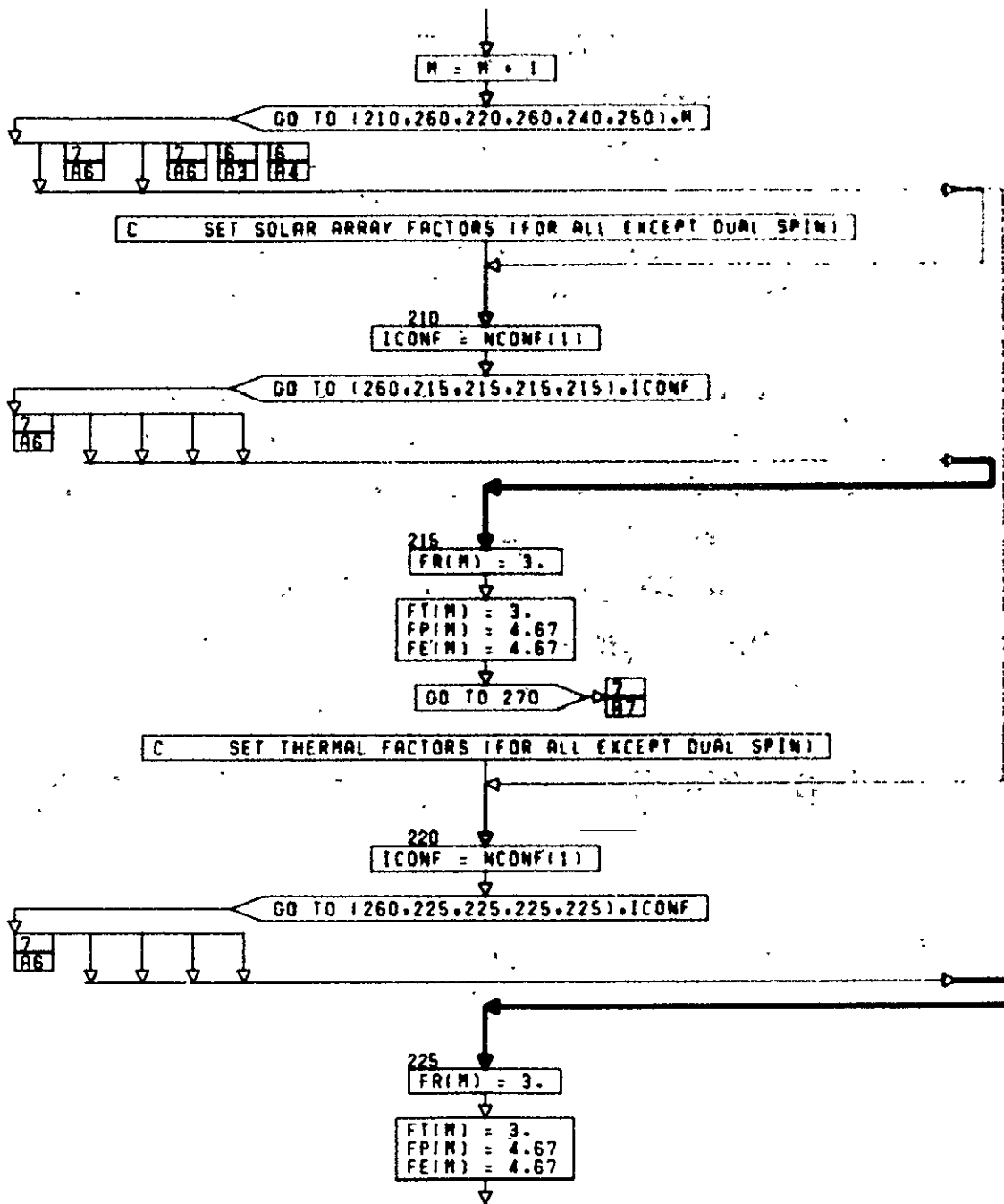


C \*\* COMPUTATIONS FOR SUBSYSTEM COSTS BASED ON COST ESTIMATING  
 C \*\* RELATIONSHIPS (C.E.R.-S)



CONT. ON PG 5

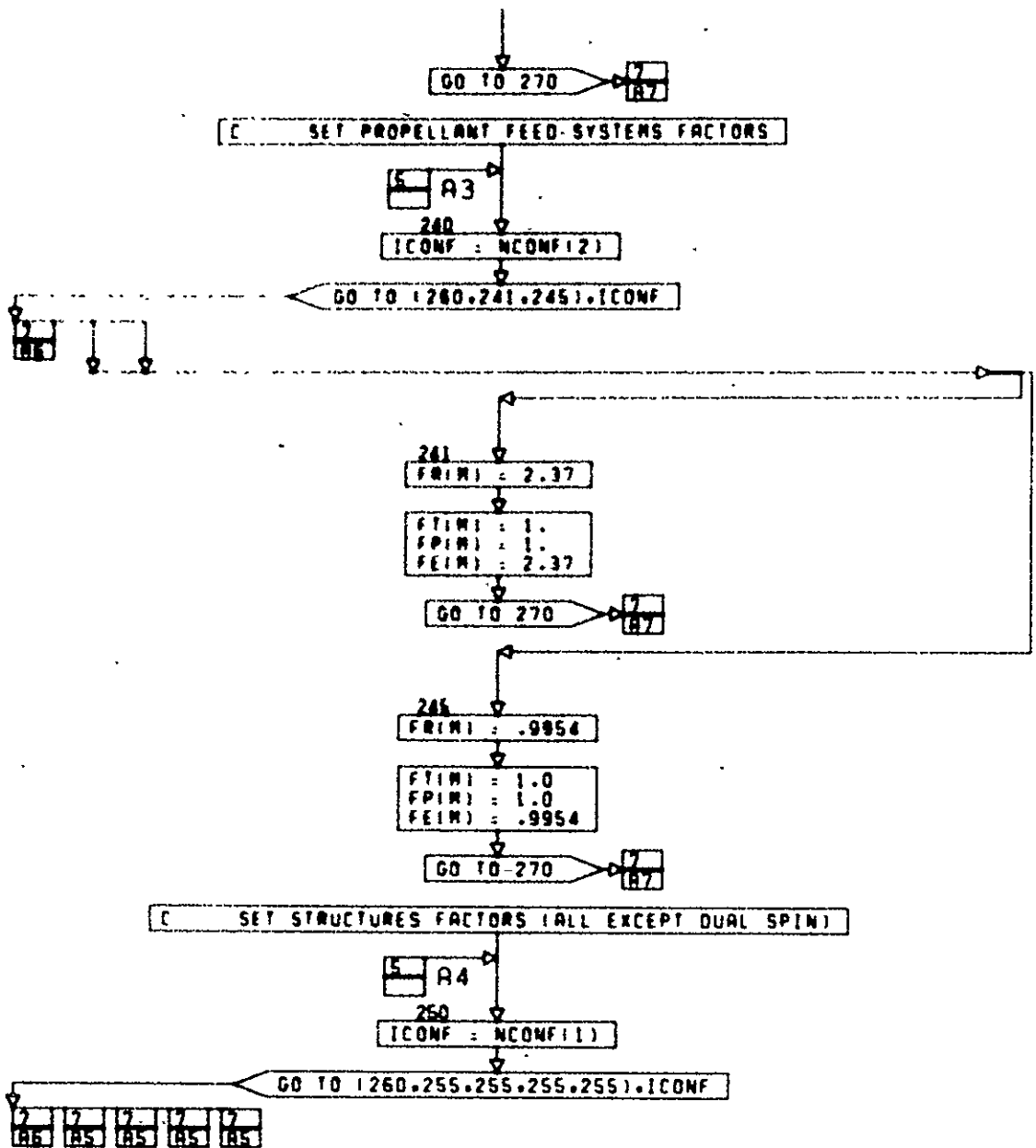
PG 4 OF 14



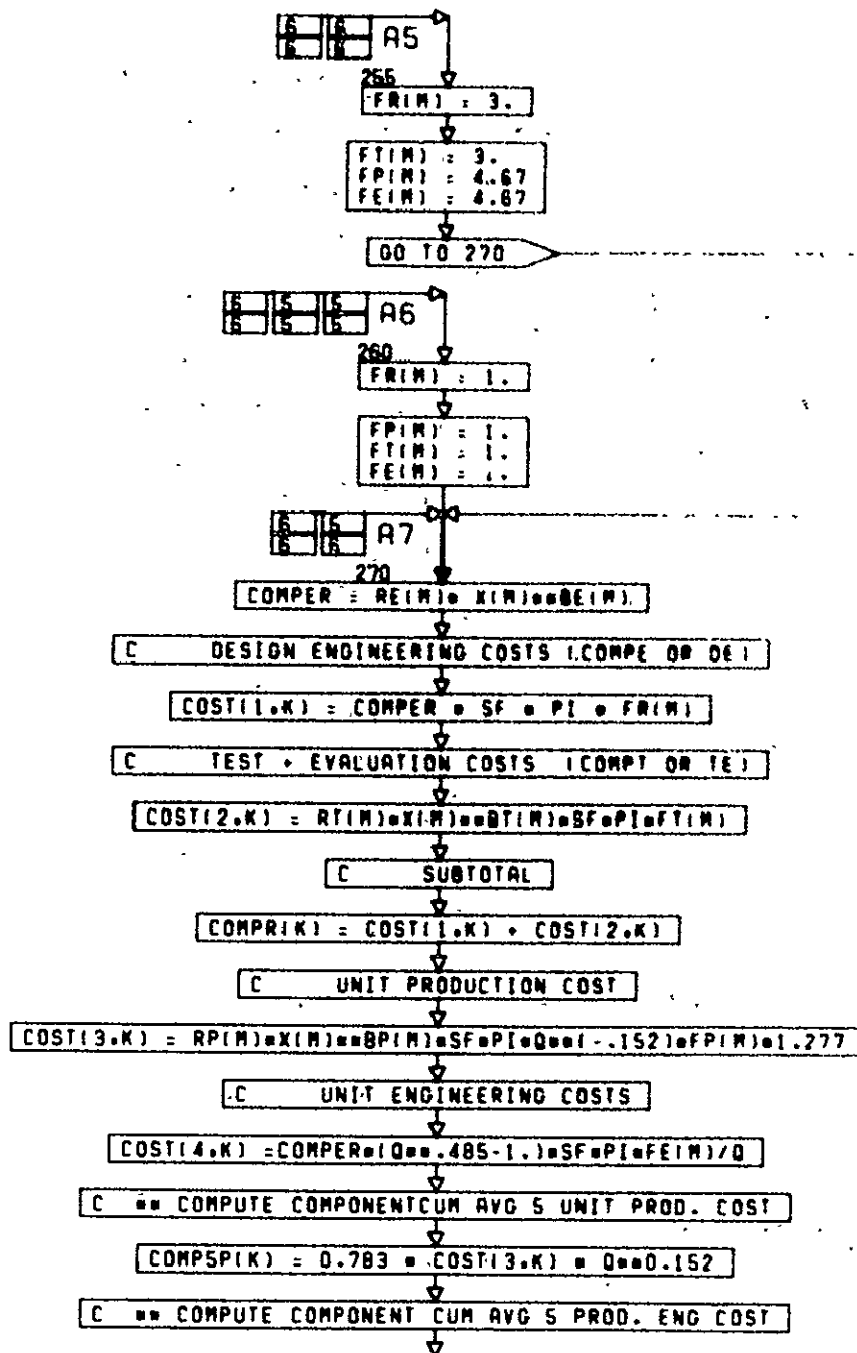
CONT. ON PG 6

PG 5 OF 14

020



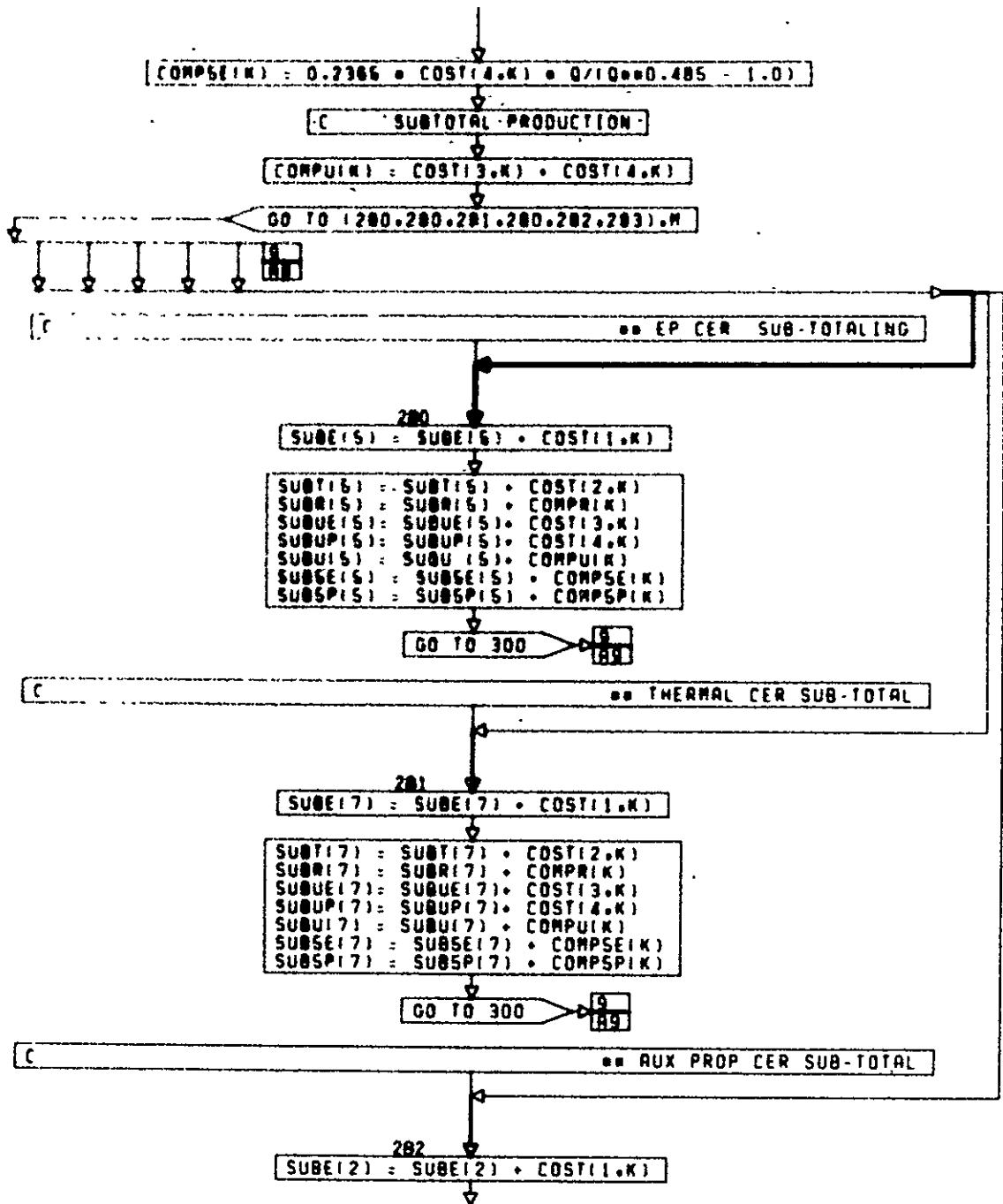
CONT. ON PG 7



CONT. ON PG 8

PG 7 OF 14

821



CONT. ON PG 9

PG 8 OF 14



```

SUBT(2) = SUBT(2) + COST(2,K)
SUBR(2) = SUBR(2) + COMPR(K)
SUBUE(2) = SUBUE(2) + COST(3,K)
SUBUP(2) = SUBUP(2) + COST(4,K)
SUBUI(2) = SUBUI(2) + COMPU(K)
SUBSE(2) = SUBSE(2) + COMPSE(K)
SUBSP(2) = SUBSP(2) + COMPSP(K)

```

DO TO 300

C STRUCTURE CER=SUB-TOTAL

A8

SUBE(6) = SUBE(6) + COST(1,K)

```

SUBT(6) = SUBT(6) + COST(2,K)
SUBR(6) = SUBR(6) + COMPR(K)
SUBUE(6) = SUBUE(6) + COST(3,K)
SUBUP(6) = SUBUP(6) + COST(4,K)
SUBUI(6) = SUBUI(6) + COMPU(K)
SUBSE(6) = SUBSE(6) + COMPSE(K)
SUBSP(6) = SUBSP(6) + COMPSP(K)

```

A9

CONTINUE

C SUM SUB-TOTALS BY SUBSYSTEMS OF CATALOG ITEMS

IJ = 1  
IK = 0

DO 320 J=1,5

IF (I,J.NE.1)

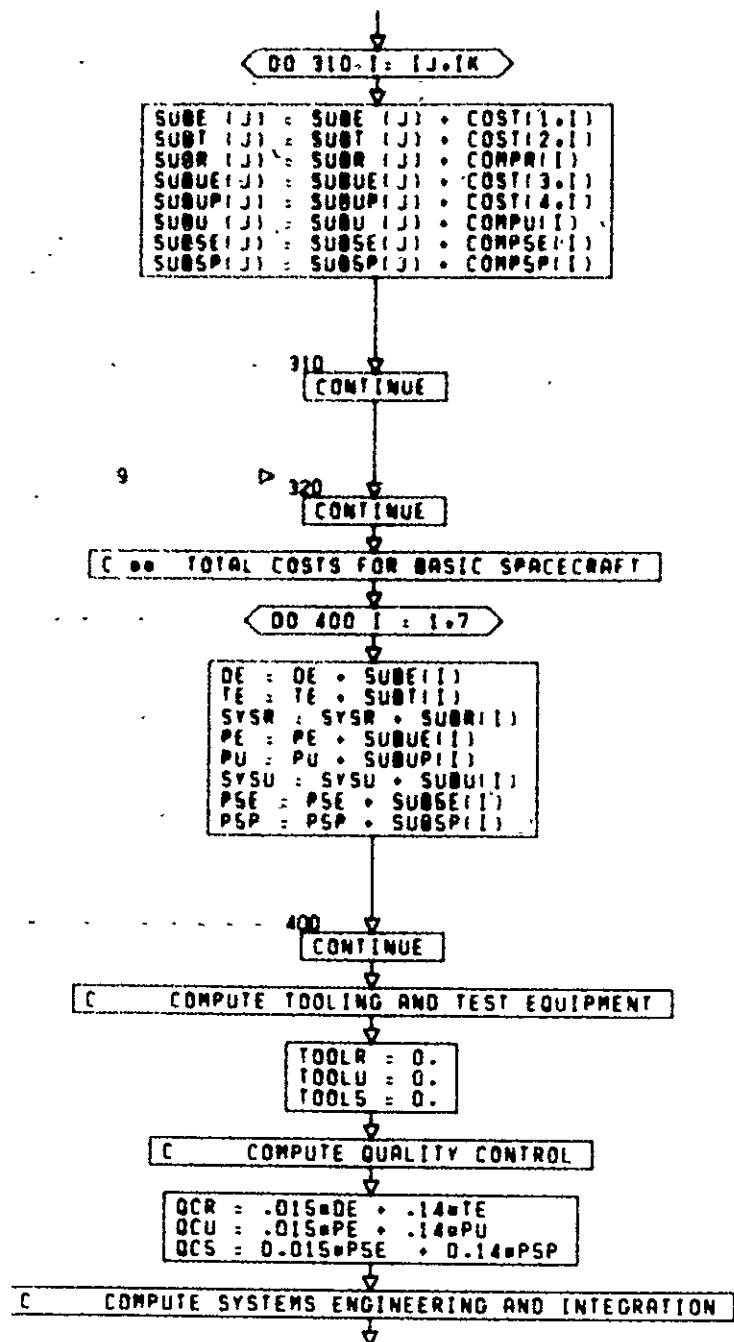
IJ = IK + 1

IK = IK + NEQUI(I,J)

CONT. ON PG 10

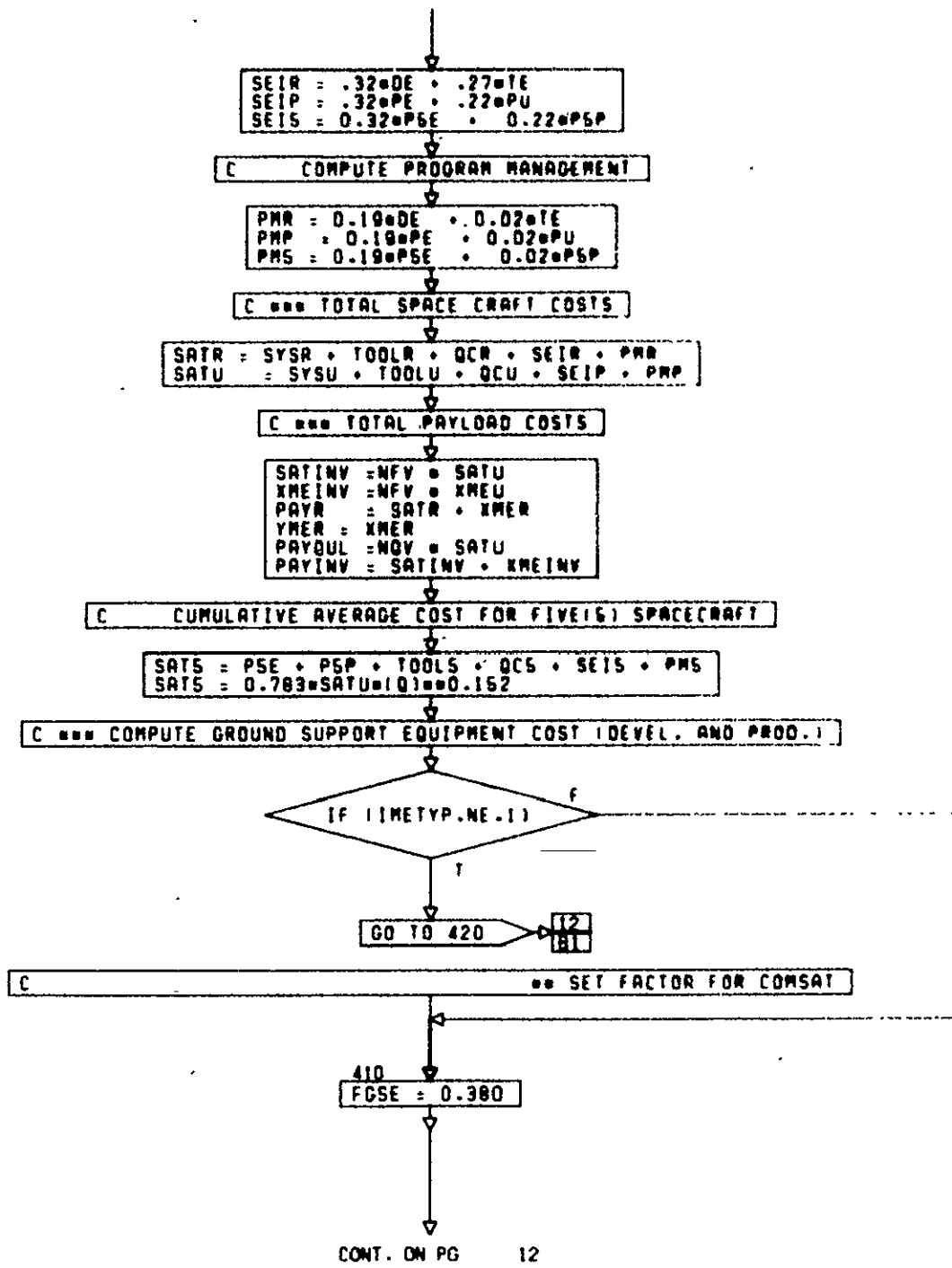
PG 9 OF 14

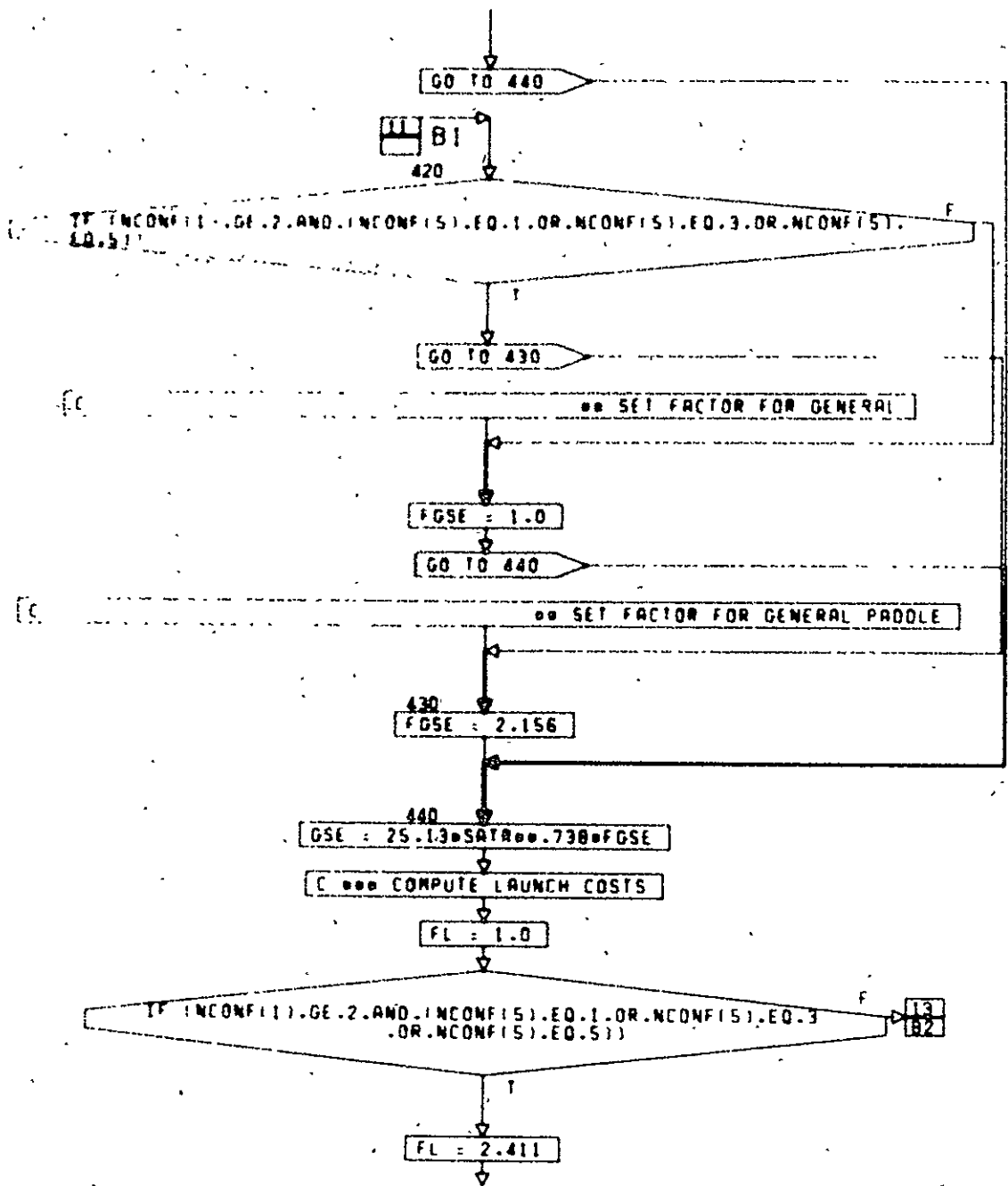
022



CONT. ON PG 11

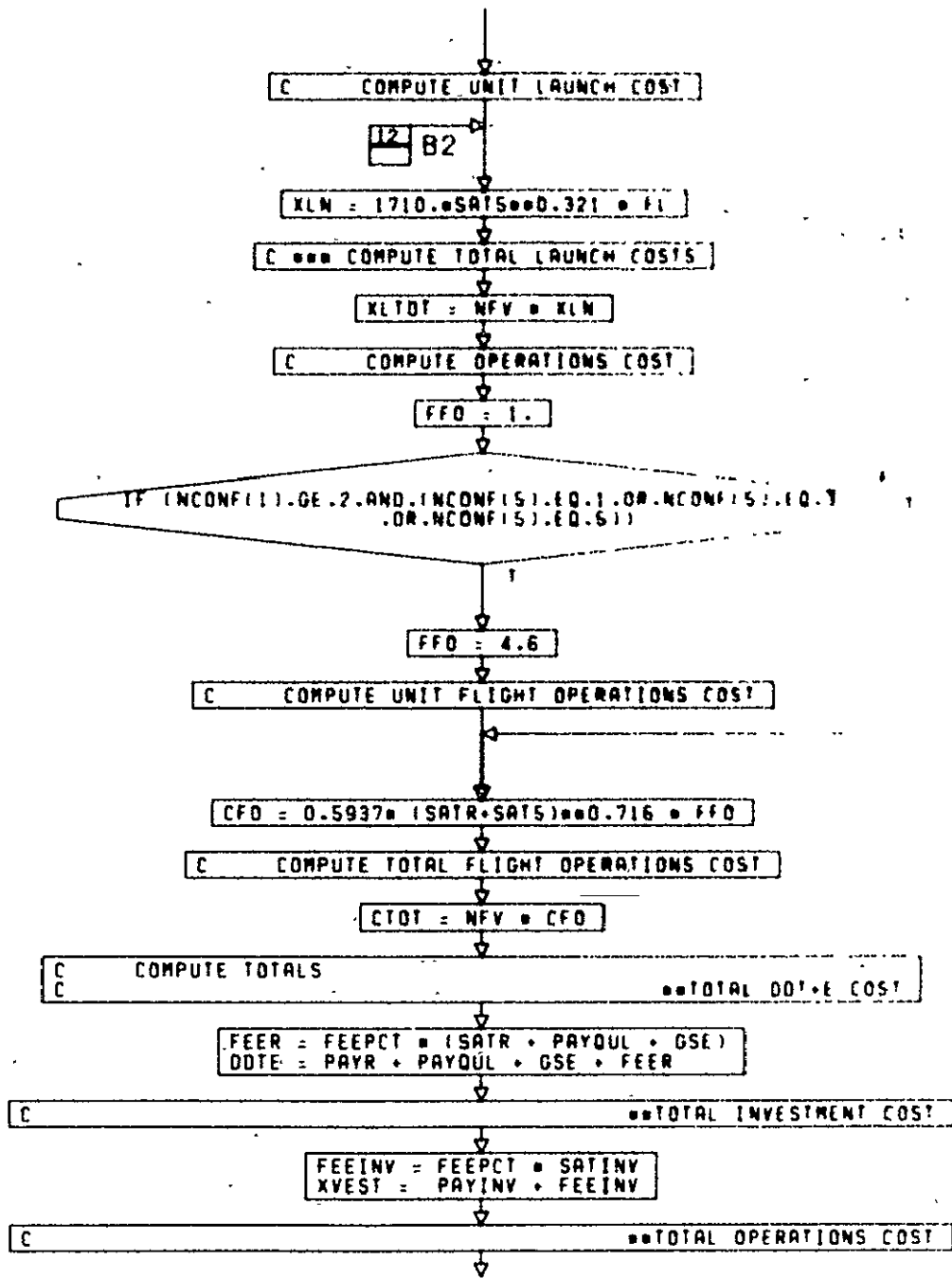
PG 100F 14





CONT. ON PG 13

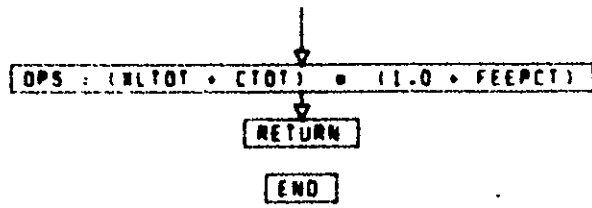
PG 12 OF 14



CONT. ON PG 14

PG 1 OF 14

024



PG 14 FINL

SUBROUTINE PRINTERR,NEQUIP,NACCEP,NCONF)

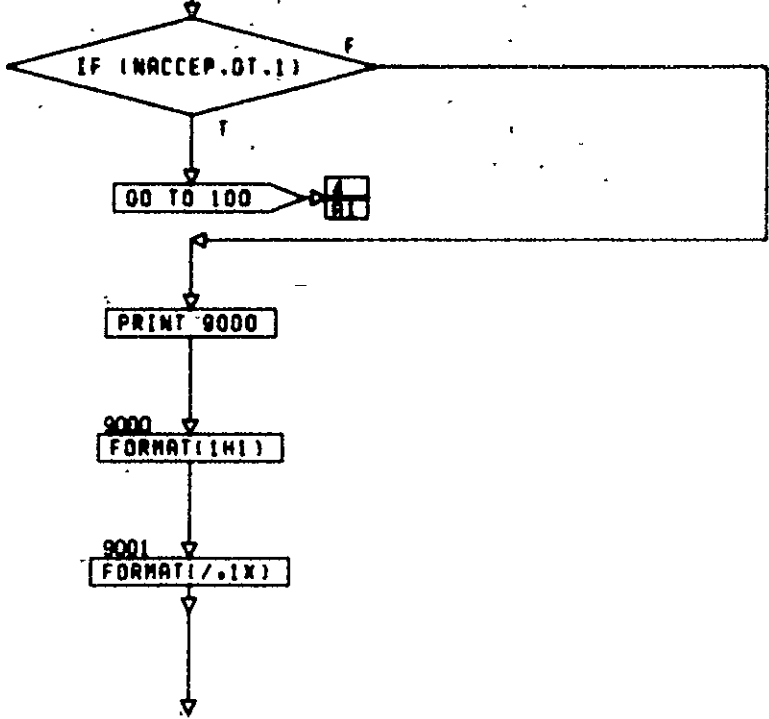
C ■ THIS IS THE OUTPUT SUBROUTINE WHICH CONTROLS THE PRINTED ■  
 C ■ OUTPUT OF ANY ACCEPTABLE DESIGN ■  
 C ■

COMMON /BTWN/WT,VOL,DT,O,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,TI,PL,PLAIN,  
 LMBDD,AREA,SATLO,WATE,NC,ACSNP,WARMNT,TACMNT,CONVMT,TAKMT,PASSTR,  
 SATMT,TPRIN,ITLOC,RADA,RADAB,RAT,HTPWA,HTPRD,HPT,HTPIPE,VCMP,  
 HPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2),EQBLG,SABDLG,SAMT

COMMON /PATCOM/ACCRCY,CISTAR,IREL,MADOLD,TRUNC,ITRUNC, DE,TE,  
 TOOLR,OCR,SEIR,PRR,PE,PU,TOOLU,OCF,SEIP,PPR,SATR,SATINV,NER,  
 MEINV,PAYR,PAYINV,PAYOUL,OSE,XLTOT,CTOT,FEER,FEEINV,ODTE,XVEST,  
 OPS, SKTAU(8),ROLD(60),T,AM,TS,BS,AM,TF,BF,TC,TA,TO,TOTOPS

COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),REL(6,60),  
 TMM(4,60),DPIR(11,60)

COMMON /OBCOR/IOB(30),DATAB(55,90)  
 DIMENSION IERR(7),NEQUIP(5),NCONF(6)  
 REAL MADOLD  
 MADOLD=MADOLD/720.  
 TRUNC=TRUNC/720.



CONT. ON PG 2

028

PRINT 9002

9002

FORMAT(30X,41H) NASA SYSTEMS COST/PERFORMANCE STUDY \*\*)

PRINT 9001  
PRINT 9010

9010

FORMAT(16H) DEFINITIONS - - / .25H CONFIGURATIONS (NCONF) / .5X.  
36H STABILIZATION AND CONTROL (NCONF(1)) / .15X .31H AUXILIARY PROPULSION  
(NCONF(2)) / .7X .23H NCONF(1)=1 IS DUAL SPIN .20X .22H NCONF(2)=1 IS  
COLD GAS / .7X .22H NCONF(1)=2 IS VAW SPIN .29X .20H NCONF(2)=2 IS MONOP  
ROPELLANT / .7X .20H NCONF(1)=3 IS MASS EXPULSION .23X .26H NCONF(2)=3 IS  
BIPROPELLANT / .7X .37H NCONF(1)=4 IS MASS EXPULSION W/ CMO-S .12X .2  
5H COMMUNICATIONS (NCONF(4)) / .7X .30H NCONF(1)=5 IS MASS EXPULSION W  
/ R.M.-S .13X .42H NCONF(4)=1 IS SEPARATE UPLINK AND DOWNLINK / .5X .46

DATA PROCESSING AND INSTRUMENTATION (NCONF(3)) / .7X .41H NCONF(4)=2 IS  
UNIFIED LINK-COMMON ANTENNA / .7X .39H NCONF(3)=1 IS GENERAL PURPOSE  
PROCESSOR .12X .43H NCONF(4)=3 IS UNIFIED LINK-SEPARATE ANTENNA / .7  
X .30H NCONF(1)=2 IS SPECIAL PURPOSE PROCESSOR .12X .40H NCONF(4)=4 IS  
UNIFIED LINK-COMMON ANT + DOWNLINK / .5X .27H ELECTRICAL POWER (NCONF  
(5)) / .26X .50H NCONF(4)=5 IS UNIFIED LINK-SEPARATE ANT + DOWNLINK / .7  
X .44H NCONF(5)=1 IS SHUNT REGULATION - PADDLE MTD .5X .25H VEHICLE SI  
ZING (NCONF(6)) / .7X .42H NCONF(5)=2 IS SHUNT REGULATION - BODY MTD.

.9X .22H NCONF(6)=1 IS CYLINDER / .7X .44H NCONF(5)=3 IS SHNT + DISCH.R  
EG - PADDLE MTD .7X .17H NCONF(6)=2 IS BOX / .7X .42H NCONF(5)=4 IS SHN  
T + DISCH.REG - BODY MTD .9X .20H NCONF(6)=3 IS SPHERE)

PRINT 9011

9011

FORMAT(17X,44H) NCONF(5)=5 IS SERIES LOAD REG. - PADDLE MTD .5X .11H R  
ELIABILITY / .7X .42H NCONF(5)=6 IS SERIES LOAD REG. - BODY MTD .9X .4  
SHREDUNDANCY CONFIGURATION = 0 IS SINGLE STRING / .58X .43H REDUNDANC  
Y CONFIGURATION = 1 IS DUAL STRING)

CONT. ON PG 3



PRINT 9001  
PRINT 9012

9012

FORMAT 110H MESSAGES (IERR),/.5X.25HSTABILIZATION AND CONTROL.26  
X.20HAUXILIARY PROPULSION,/.7X.28HIERR = 0 MEANS NO MESSAGES.27  
X.27HIERR = 0 MEANS NO MESSAGES,/.7X.49HIERR = 1 MEANS MAX ALL  
OWABLE SYS. ERROR UNSAT.,.2X.60HIERR = 1 MEANS CYCLE LIFE OF ATTIT  
UDE AND CONTROL,/.7X.42HIERR = 1X MEANS MAX RATE ERROR TOO SMALL  
.25X.22HTHRUSTERS IS TOO SHORT,/.7X.42HIERR = 1XX MEANS 3-AXIS MM  
EELS ACCEPTABLE,9X.62HIERR = 10 MEANS CYCLE LIFE OF TRANSLATIONAL  
THRUSTER,/.7X.42HIERR = 1XXX MEANS DBL QIMB.CMOS ACCEPTABLE,25X.12

HIS TOO SHORT,/.5X.35HDATA PROCESSING AND INSTRUMENTATION,10X.49HI  
ERR = 11 MEANS CYCLE LIVES OF BOTH THRUSTERS ARE,/.7X.30HIERR =  
0 MEANS NO MESSAGES,37X.9HTOO SHORT,/.7X.31HIERR = 1 MEANS M  
UX REQUIRED,18X.7HTHERMAL,/.7X.41HIERR = 10 WORD LENGTH GREATER  
THAN 256,10X.49HIERR = 1XXXXXXXXX MEANS BATT RAD AREA IS SUPPLIE  
D,/.7X.34HIERR = 100 BIT RATE IS TOO LARGE,35X.8MIN RADA,/.7X.3  
6HIERR = 1000 SPEC.COMD.SYNC.FLO ME 0.15K, 61HIERR = 1XXXXXXXXX  
MEANS OSR CONV. AND VARIABLE COND ,/.7X.36HIERR = 10000 END OF DAT

A BASE SENSED,33X.34HUCTANCE HEAT PIPE INFO IS REQUIRED,/.5X.14HYE  
HICLE SIZING,39X.45HIERR = 2X1XXXXXXXXX MEANS PHASE CONTROL MASS (S)

PRINT 9013

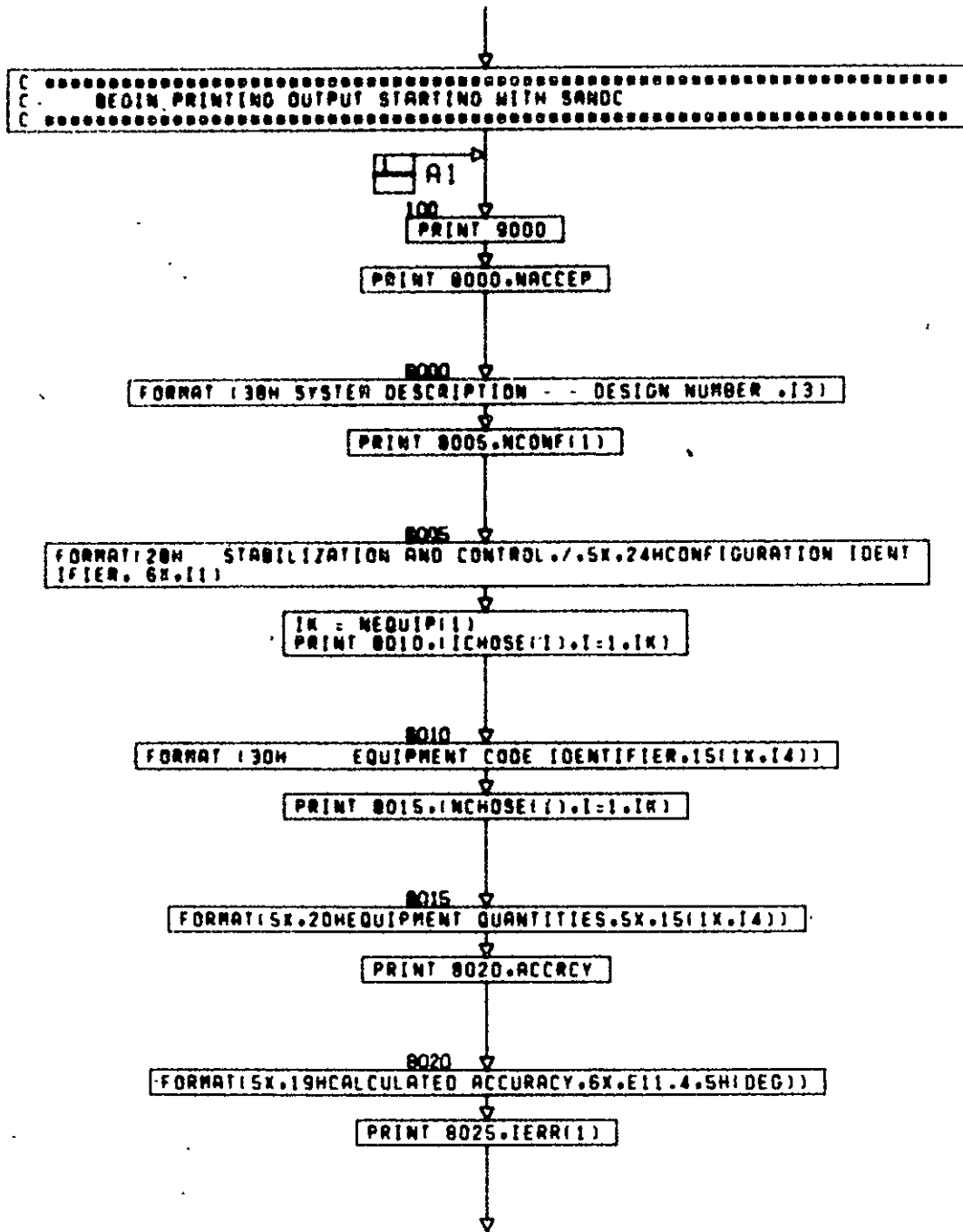
9013

FORMAT 17X.26HIERR = 0 MEANS NO MESSAGES,43X.15HSUPPLIED IN PCM,/.  
7X.46HIERR = 1 MEANS BODY MOUNTED SOLAR ARRAY LENGTH,5X.50HIERR =  
XXX1XXXXXXXX MEANS ISOTHERMALIZER IS REQUIRED,/.16X.20HENCEEDS EQUIP  
MENT BAY LENGTH,14X.51HIERR = XXXX1XXXXXXXX MEANS DIODE HEAT PIPE IS  
REQUIRED,/.76X.12H(2 REQUIRED),/.58X.51HIERR = XXXXX1XXXX MEANS CO  
NV. HEAT PIPE IS REQUIRED,/.58X.48HIERR = XXXXX1XXXX MEANS OSR RAD  
IATOR IS REQUIRED,/.58X.50HIERR = XXXXXXX1XX MEANS CONV. RADIATOR  
IS REQUIRED,/.58X.48HIERR = XXXXXXX1X MEANS HEATER POWER IS SUPPL

IED,/.76X.9HIN HTRPWR,/.58X.49HIERR = XXXXXXXXXXI MEANS RADIATOR AR  
EA IS SUPPLIED,/.76X.7HIN RADA)

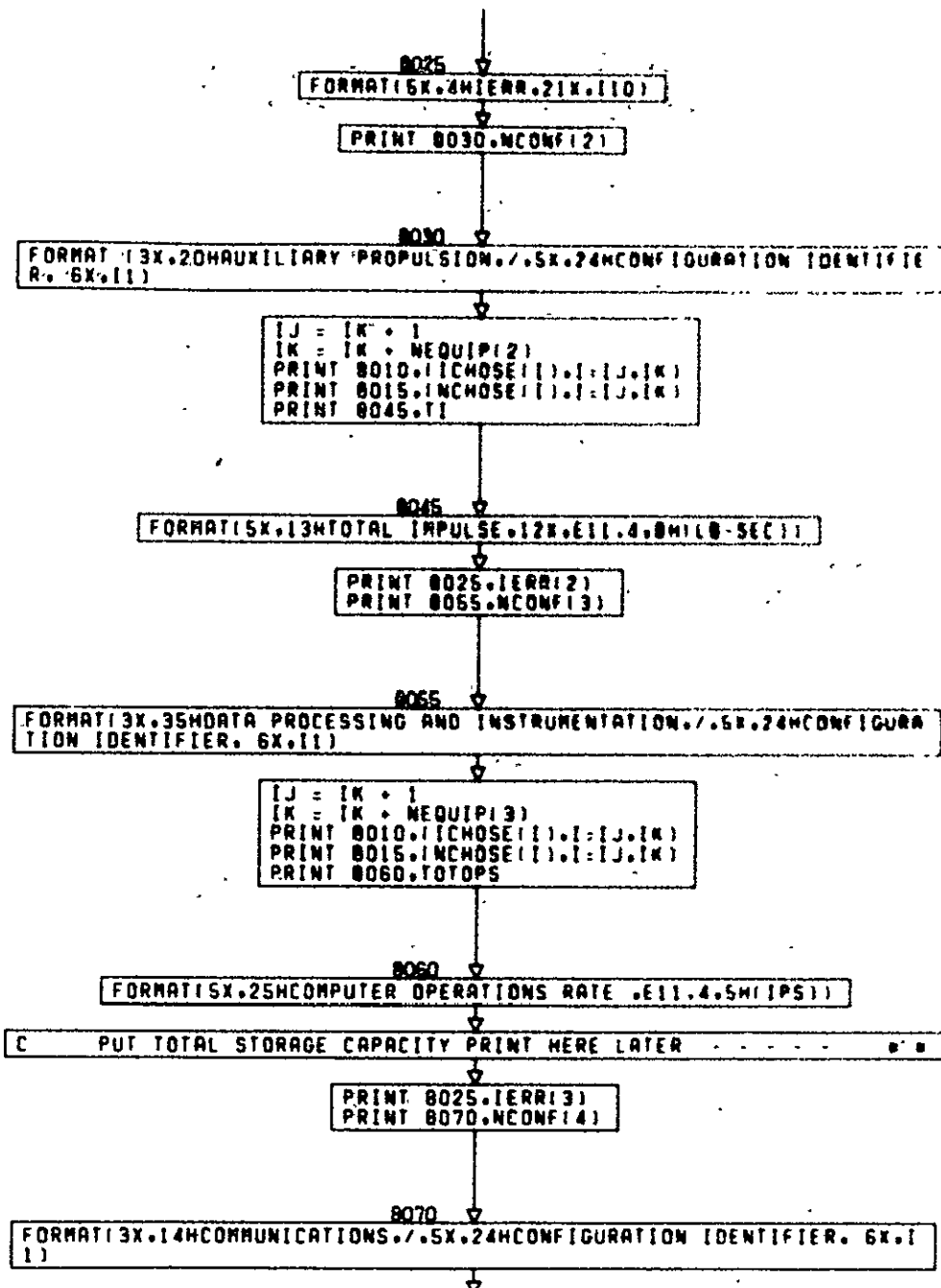
CONT. ON PG 4

PG 3 OF 12



CONT. ON PG 5

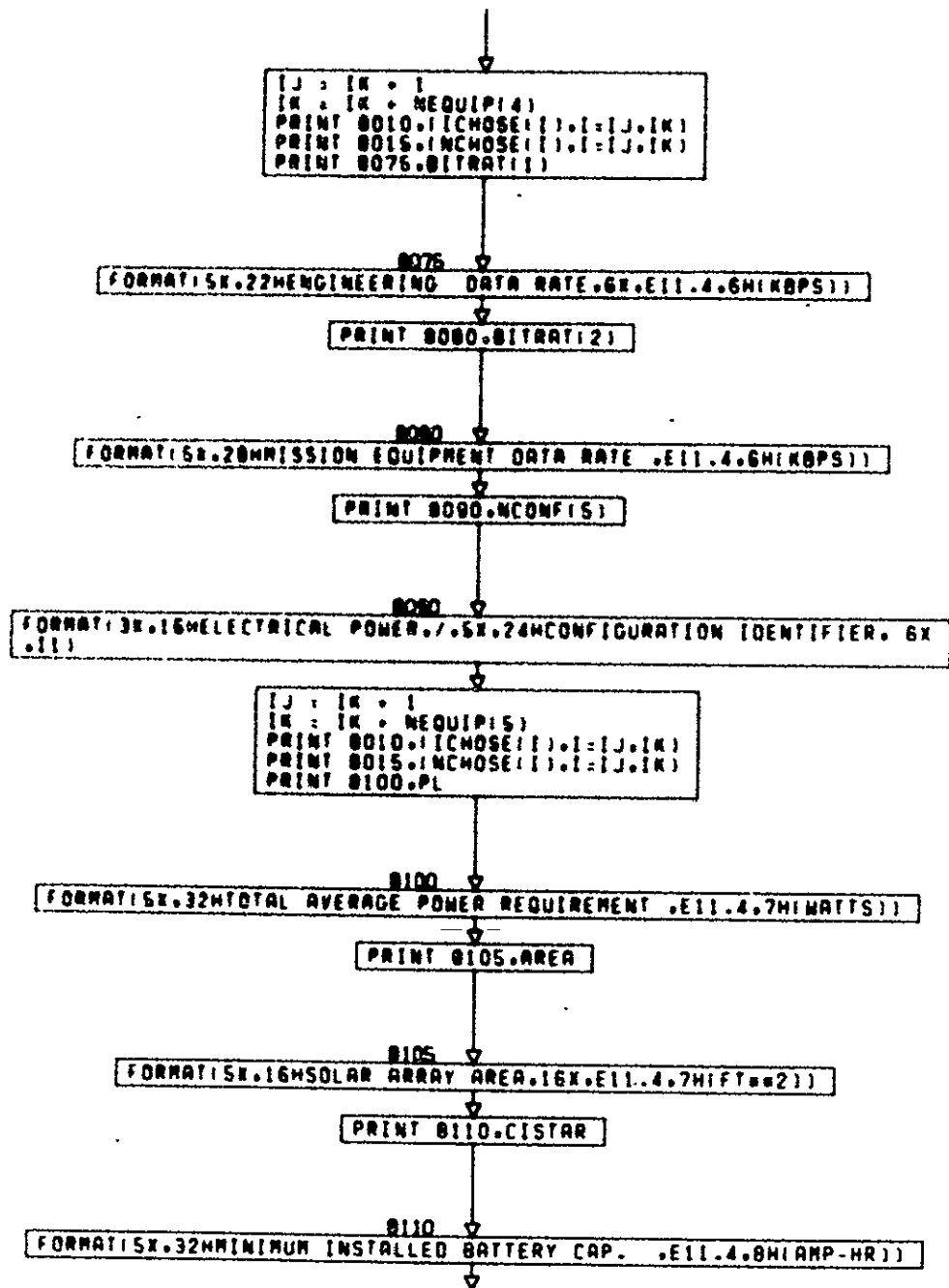
PG 4 OF 12



CONT. ON PG 6

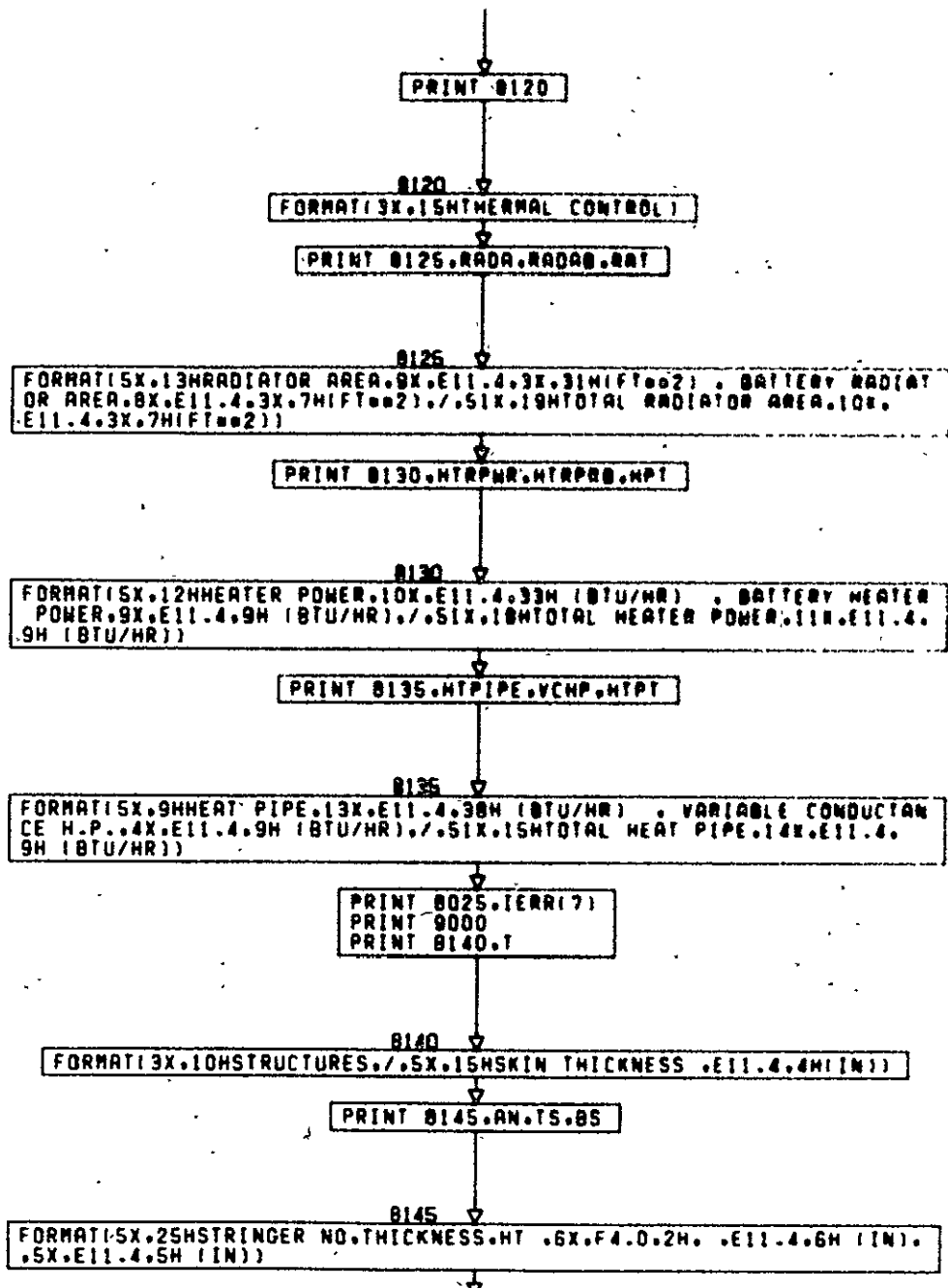
PG 5 OF 12

120



CONT. ON PG 7

PG 6 OF 12



CONT. ON PG 8

PG 7 OF 12

029

PRINT 0160,AM,TF,BF

0160  
FORMAT:6X,75MFRAME NO.,THICKNESS,MT,6X,F4.0,2M, E11.4,6M (IN),  
.5X,E11.4,6M (IN)

PRINT 0165,TC,TD,TA

0165  
FORMAT:6X,30MEND COVER THICKNESS, FORWARD, E11.4,12M (IN),CENTER,  
(1),4,8M (IN),AFT, E11.4,4M (IN)

PRINT 0160,NCONFIG1,SATM,SATLO,0,0

0160  
FORMAT:3X,14MVEHICLE SIZING,7,5X,24MCONFIGURATION IDENTIFIER,6X,  
11,7,5X,14MLAUNCH HEIGHT, E11.4,6M (LB),14X,9MLENGTH, E11.4,  
6M (IN),7,7,7MWIDTH, E11.4,  
5M (IN),15X,8MHEIGHT, E11.4,6M (IN)

PRINT 0165,XJ,XJ,ZJ

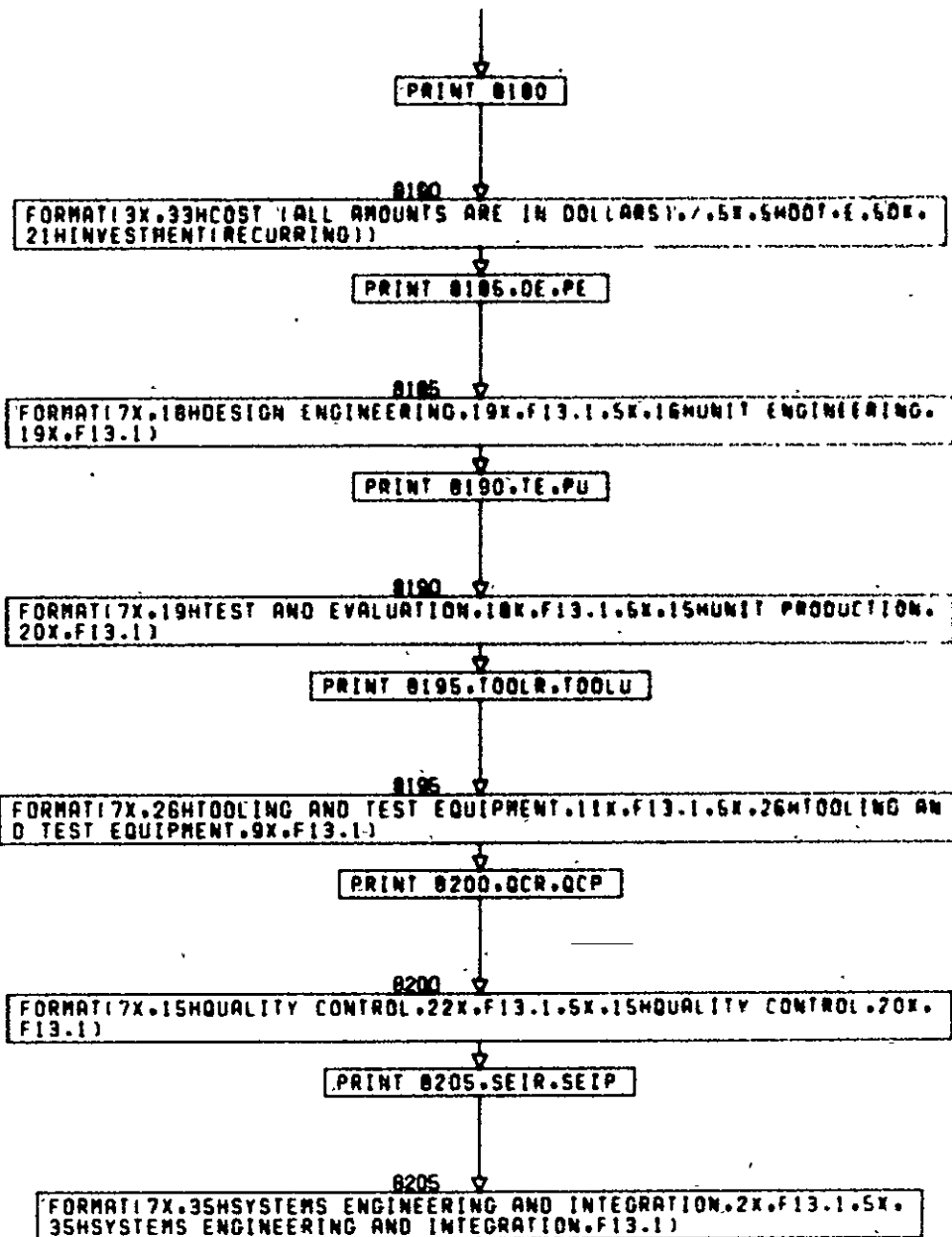
0165  
FORMAT:5X,6M (X, E11.4,12M (LB (No2)),6X,6M (Y, E11.4,12M (LB  
(No2)),6X,6M (Z, E11.4,11M (LB (No2))

PRINT 0025,IERR16)  
PRINT 0170,IREL

0170  
FORMAT:3X,7MSAFETY,7,5X,25MREDUNDANCY CONFIGURATION (12)

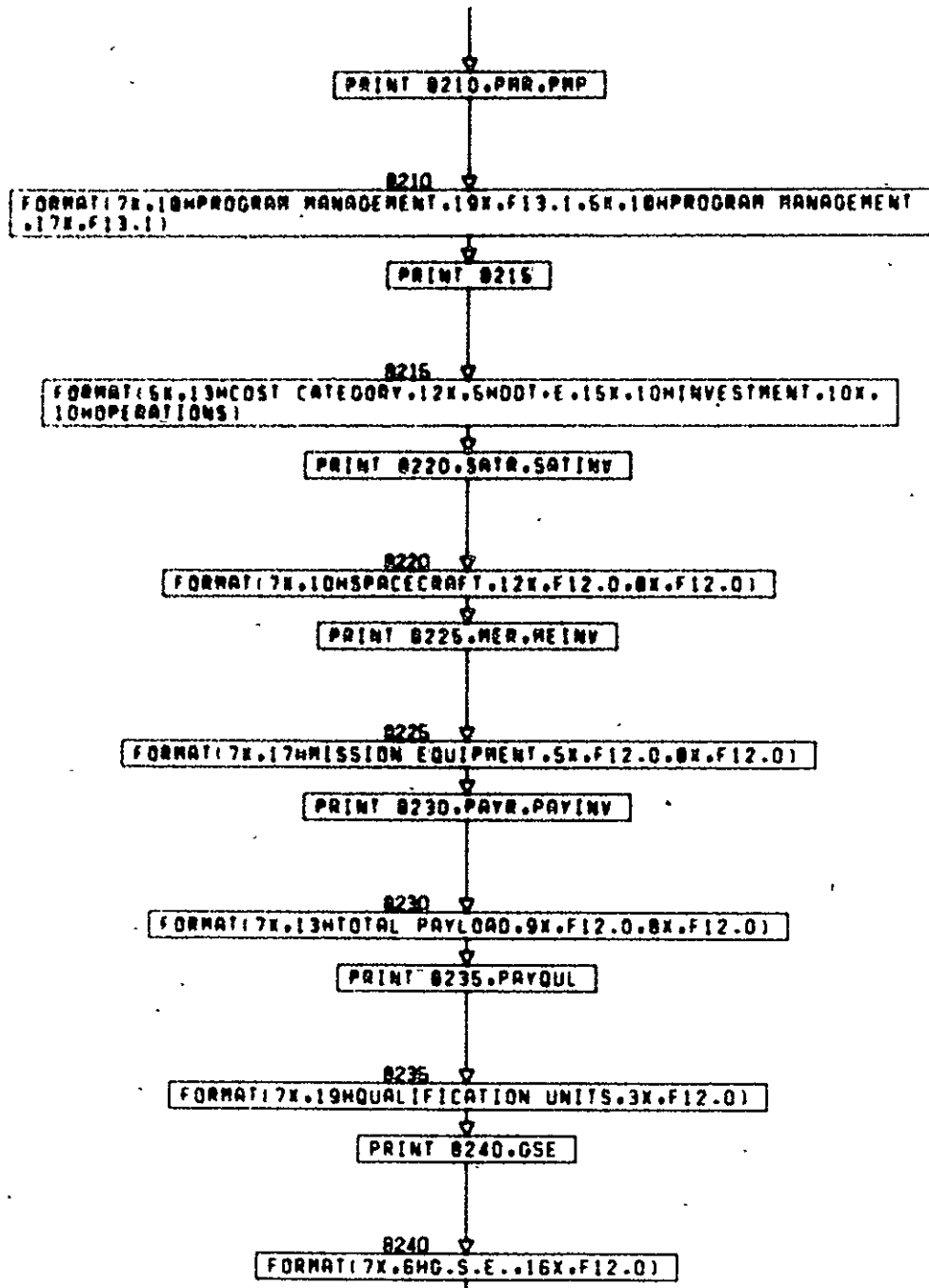
PRINT 0175,MMDOLD,ROLD (TRUNC),TRUNC

0175  
FORMAT:5X,21MMEAN MISSION DURATION,E11.4,5M (MD),11MRELIABILITY,  
E11.4,20M,RELIABILITY TRUNCATION TIME,E11.4,4M (MD)



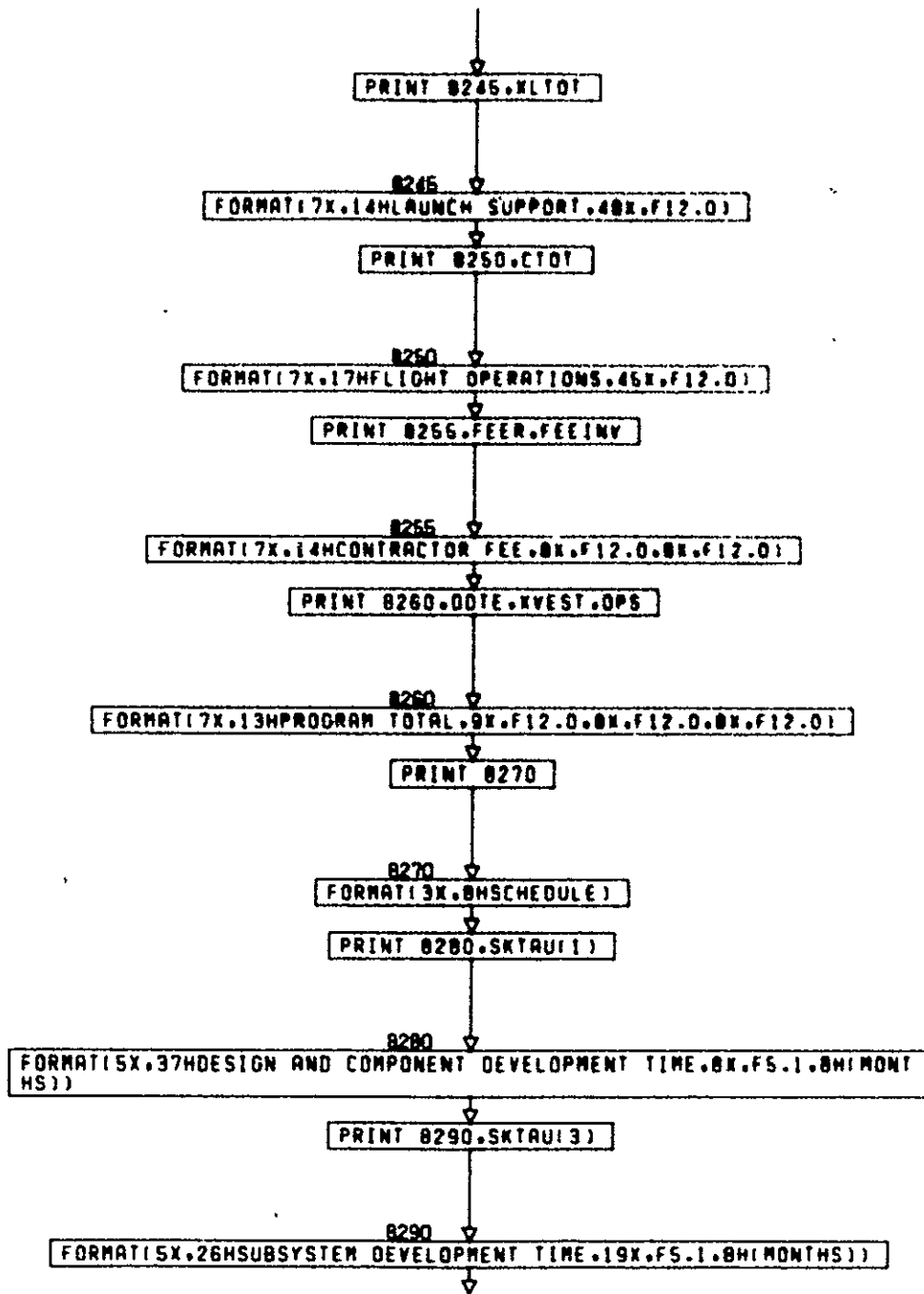
CONT. ON PG 10

030



CONT. ON PG 11

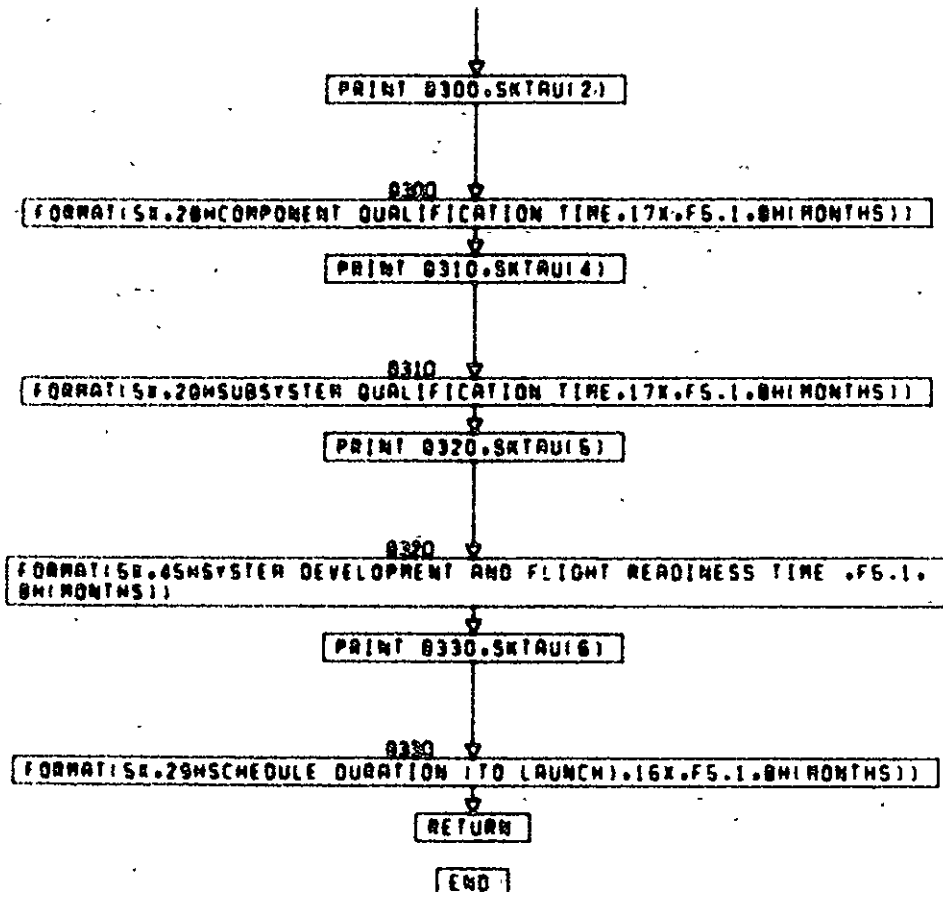




CONT. ON PG 12

PG 1 OF 12

031



SUBROUTINE FILTER(NCONF, ICODE)

C FILTER CHECKS FOR COMPATIBLE COMBINATIONS OF CONFIGURATIONS  
C A MINUS 1 IS RETURNED FOR UNACCEPTABLE COMBINATIONS  
C NCONF IS ARRAY OF CONFIGURATIONS  
C ICODE IS CODE RETURNED

DIMENSION NCONF(6)

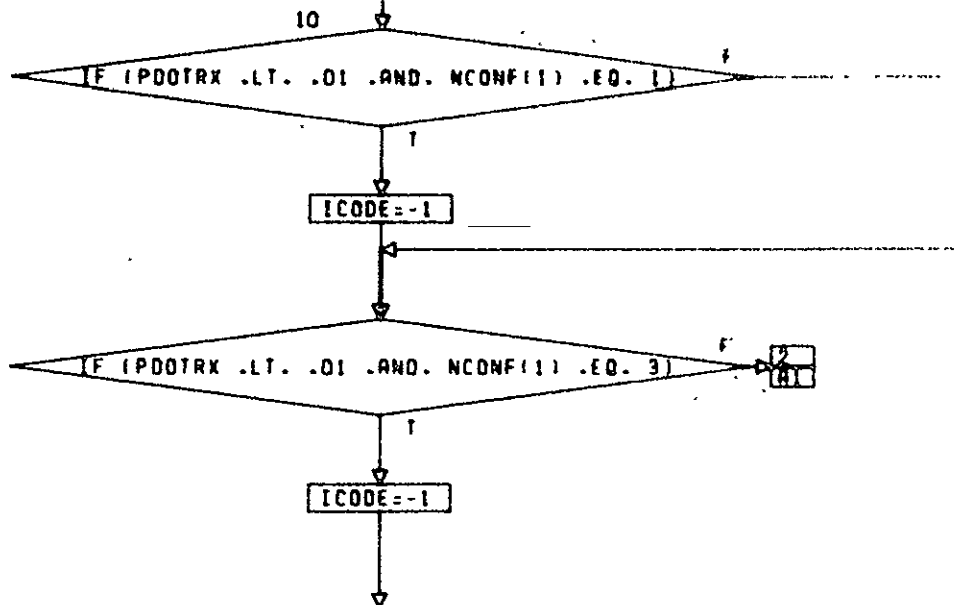
COMMON /USER1/DPHI, FE, TSHALL, XNU, PDOT0, TAU1, TAU2, T  
.PHIRX, PHIRY, PHIRZ, PDOTX, PDOTY, PDOTZ, XN, YN, ZN, PDOTRX, PDOTRY,  
PDOTRZ, OMEG0, OMEG1, XNN, K, RANV, IPAYAN, EP1, AX, AY, AZ,  
EA, EANT, ALPHA, TL, TACCEL, XNN, THOLO, PDOTRY, PDOTST, PHIDV, ISA

COMMON /USER3/BTRX, SCSFL, IPRFL, OPSMS, ARRAYN(1,3), NSEQ

COMMON /USER4/OPTCM(3), ISSEP, ISEQ, LSOLS, LUSB, FREQ(2), APOGEE, NET,  
NADR, FREQR, CORRAT, BWIDH(2)

COMMON /USER5/IVOLT, OPTMP  
ICODE=0

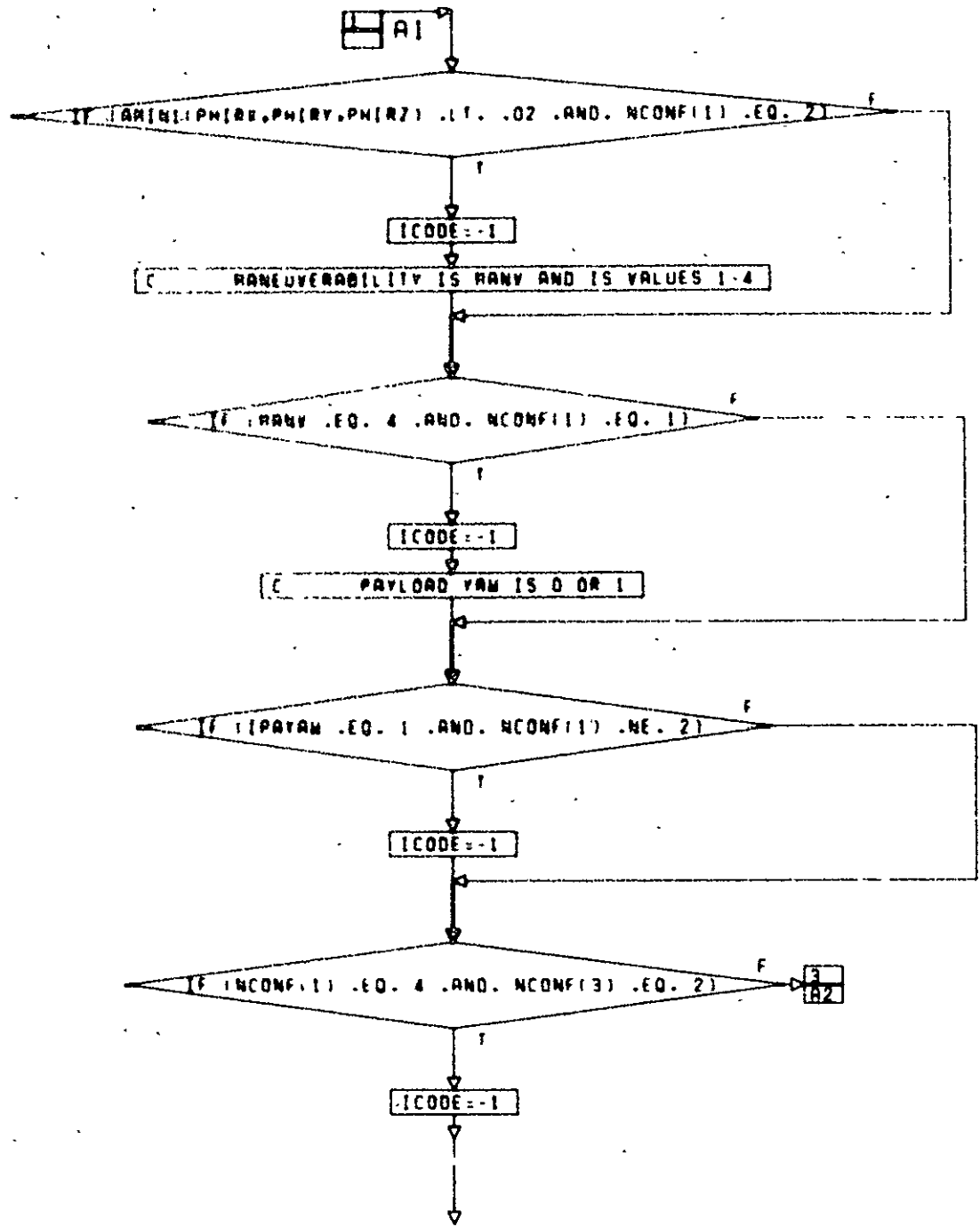
C CHECK S AND C



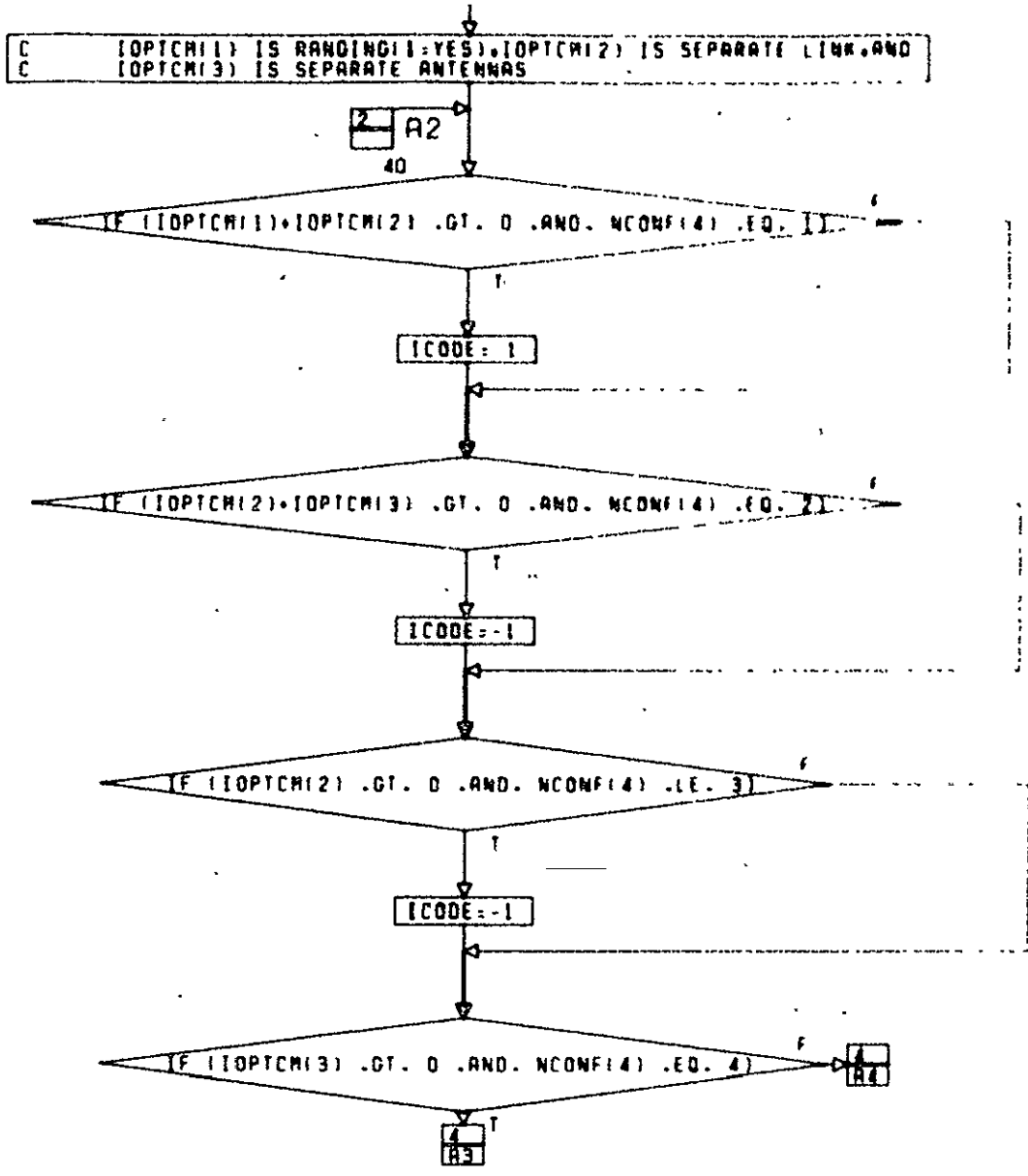
CONT. ON PG 2

PG 1 OF 6

033



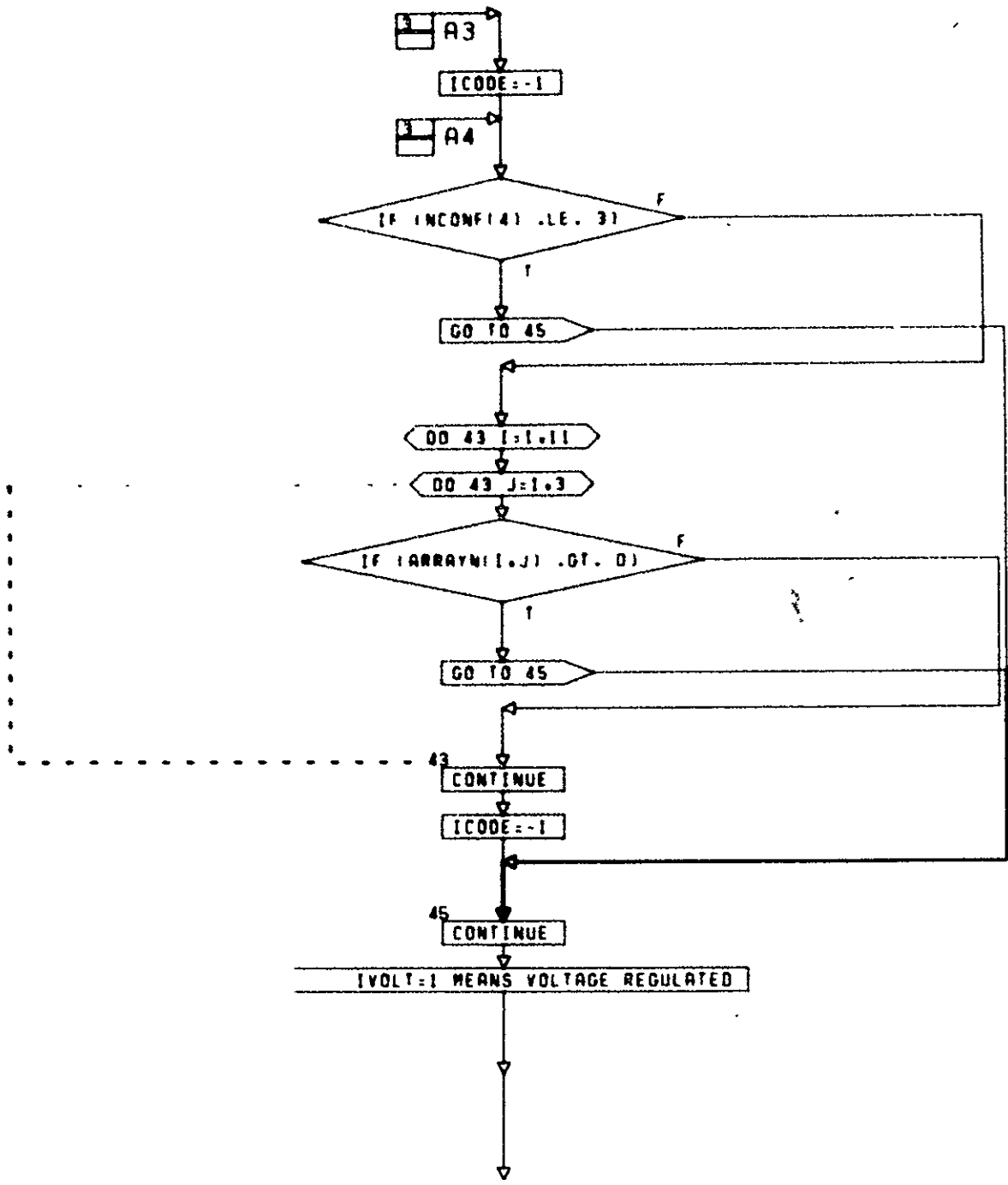
CONT. ON PG 3.



CONT. ON PG 4

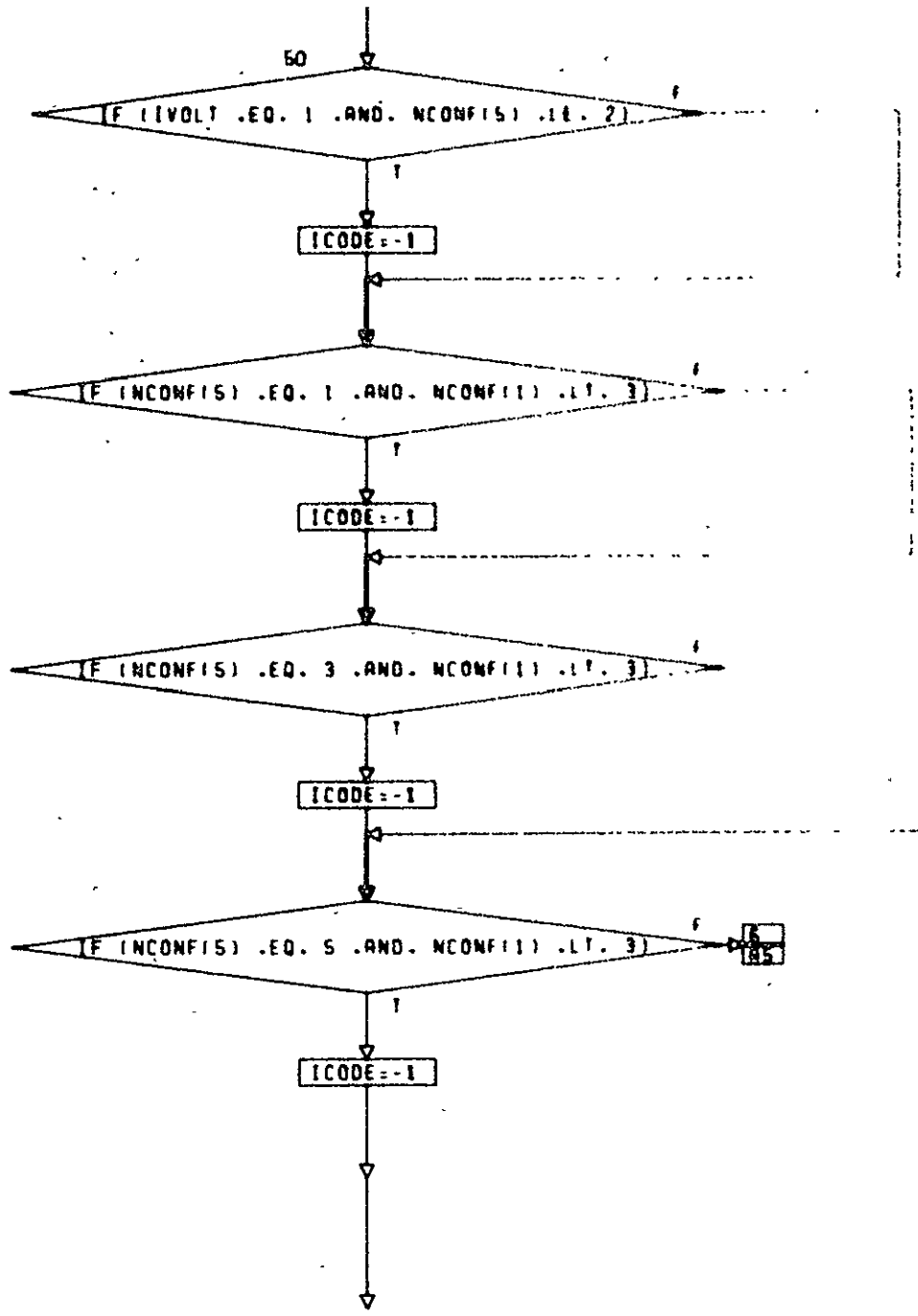
PG 3 OF 6

034



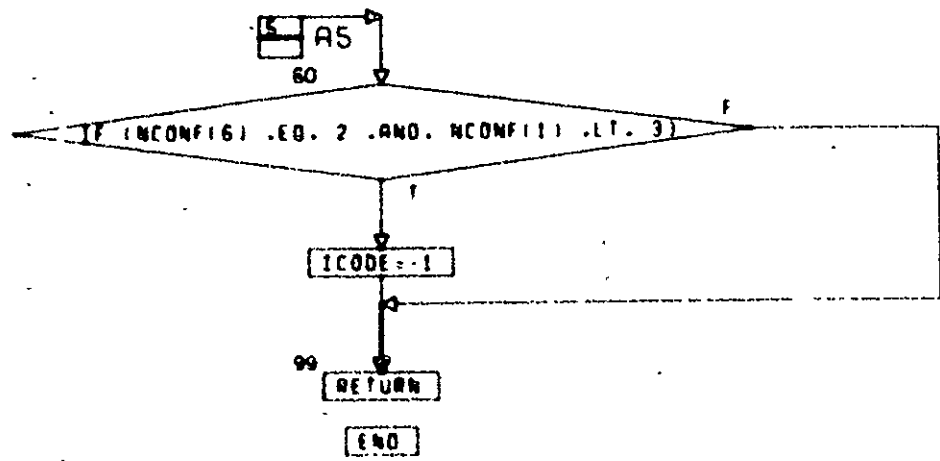
CONT. ON PG 5

PG 4 OF 6



CONT. ON PG. 6

PG 5 OF 6



PG 6 FINAL



SUBROUTINE READDB(IENDDB)

C THIS READS THE DATABASE FOR ONE SUBSYSTEM AT A TIME  
C IDB IS SET AS THE DATABASE IS READ BY SCANNING EQUIP NUMBERS

DIMENSION STORE(55)  
COMMON /DBCOM/IDB(30),DATAB(55,00)  
DATA STORE/55=0./

IF IENDDB .LE. 11

GO TO 2

IF (STORE(I) .EQ. 0.)

GO TO 2

DO 1 J=1,55

DATAB(J,I)=STORE(J)

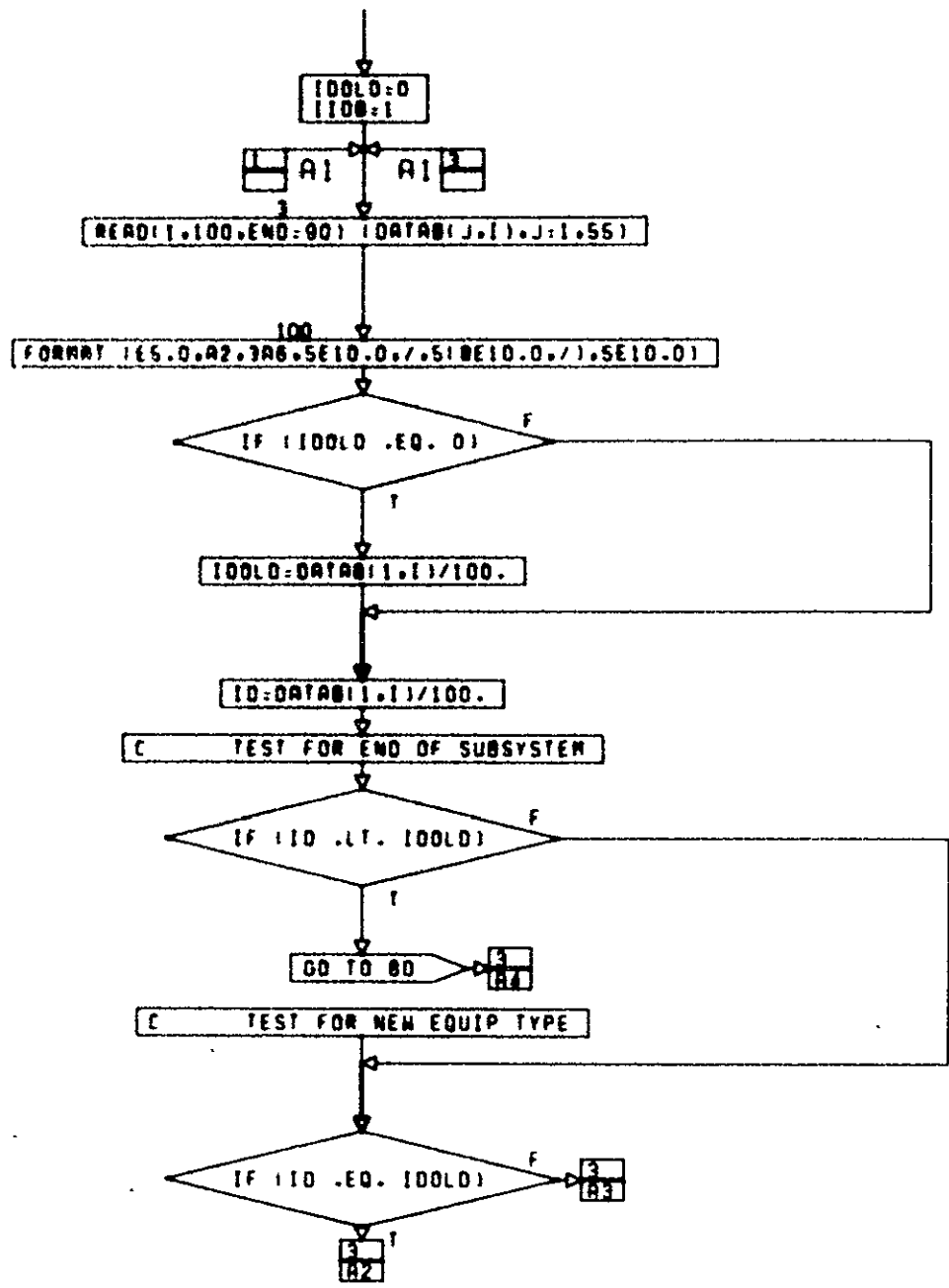
I=2  
IDOLO=STORE(I)/100.  
IDB=1

GO TO 3

I=1

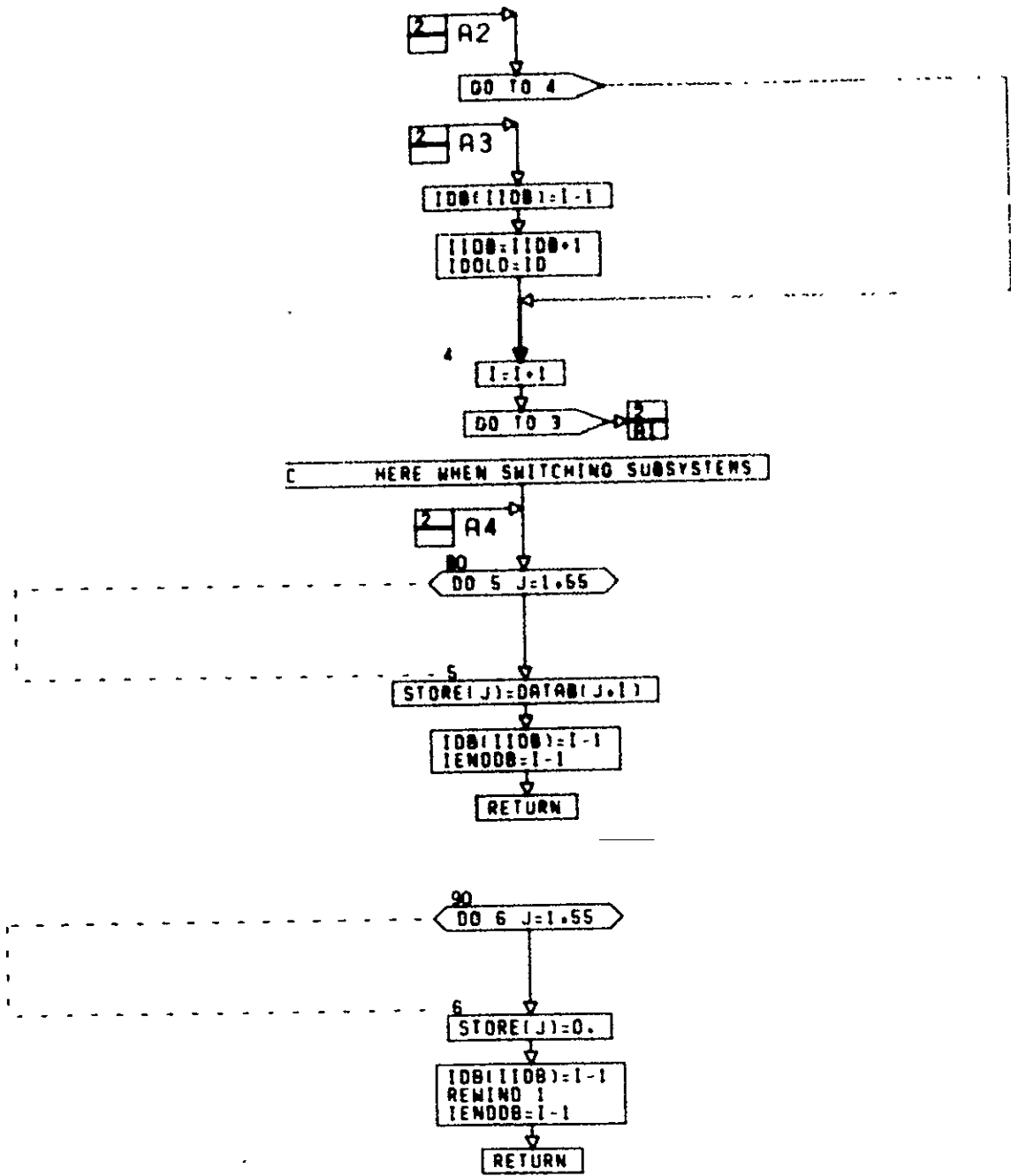
CONT. ON PG 2

PG 1 OF 4



CONT. ON PG 3

PG 2 OF 4



CONT. ON PG 4

PG 3 OF 4

END

PG 4 FINRL

10-61

SUBROUTINE SAVE(IIN,NIN,NOWAT,I,TEST,IENDD)

C THIS SUBROUTINE SAVES ICHOSE,NCHOSE,AND ANY PORTIONS OF  
C THE DATABASE REQUIRED BY LATER SUBSYSTEMS OR ROUTINES

DIMENSION IIN(15),NIN(15)  
COMMON /DBCOM/IDB(30),DATAB(55,90)

COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),REL(6,60),IWM(4,60)  
DPIA(11,60),SKD(7,60)

DO 1 I=1,I,TEST

IF (IIN(I) .LE. 0)

GO TO 1

ICHOSE(NOWAT)=IIN(I)

NCHOSE(NOWAT)=NIN(I)

DO 3 J=1,I,ENDD

IF (DATAB(I,J) .NE. IIN(I))

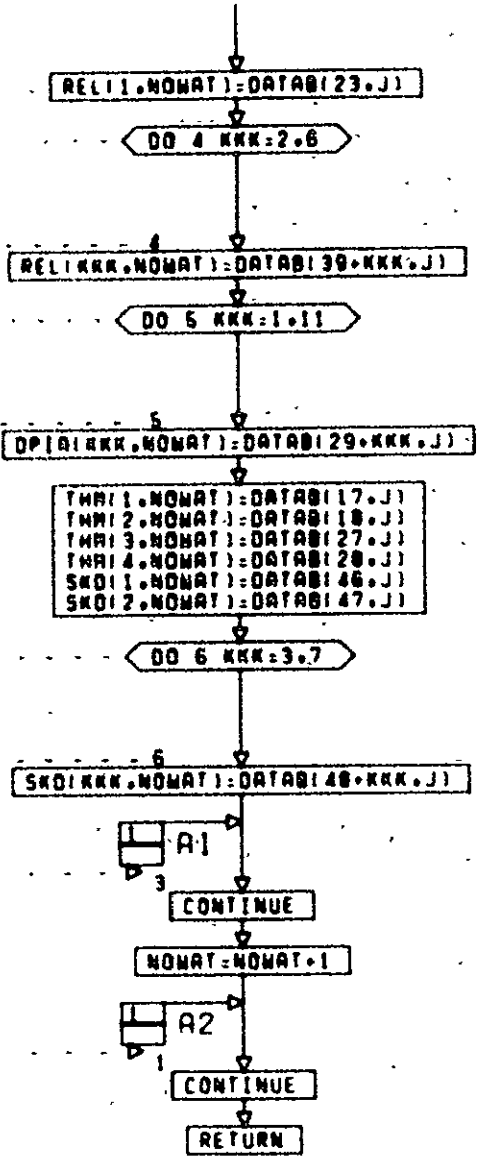
GO TO 3

DO 2 KKK=1,5

COST(KKK,NOWAT)=DATAB(45+KKK,J)

CONT. ON PG 2

PG 1 OF 2



SUBROUTINE THRML (IERR,NCONF)

COMMON /BTWN/WT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,F1,PL,PLAIN,
LMDD,AREA,SATLG,WATE,NC,ACSM,WARMT,THCAMT,CONVM,TNKM,PASST,
SATNT,TPRIN,ISTLOC,RADA,RADAB,RAT,HTPWA,HTPRB,
HPT,HTPIE,VCHP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2),
EOBLG,SABLG,SATNT

COMMON /USER7/ISATOR,ORBINC
COMMON /USER1/EDM1WT,EDM2WT,DIAMAX,ALT

COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),RELT(6,60),
THROB(4,60),DP[R(11,60),SKD(7,60)

DIMENSION NCONF(6)
REAL LN0TH

DATA SIGMA/0.1714E-08/.05/442.0/.EMISS/60.0/.ALBDD/155.0/.CONST/1.
5/.PIE/3.1415926535/

C \*\*\*\*\*
C SUBROUTINE THRML USES A METHODOLOGY FOR SIZING THE THERMAL
C CONTROL SUB-SYSTEM FOR A VARIETY OF SPACECRAFT. THIS METHODOLOGY
C DETERMINES SIZE AND PERFORMANCE OF THE THERMAL SUB-SYSTEM
C \*\*\*\*\*
C A GLOSSARY OF VARIABLES FOLLOWS - -

C \*\*\*\*\*
C CODE IS AS FOLLOWS - -
C U = USER INPUT, DB = DATA BASE, INT = INTERNAL
C O = OUTPUT, I = INPUT FROM MAIN OR OTHER S/S
C \*\*\*\*\*
C VAR. NAME CODE UNITS (DEFAULT) DESCRIPTION
C \*\*\*\*\*

C \*\*\*\*\*
C ALBDD INT 155 BTU/(HR=FT\*\*2) ALBEDO
C ALPHA INT 0.30 (DIMENSIONLESS) CONV.RAD.CONST.
C 0.08 (DIMENSIONLESS) OSR. RAD.CONST.
C ALT U N.MI. ALTITUDE
C \*\*\*\*\*

C \*\*\*\*\*
C BV INT 1.1 VDC MAX BATT.VOLT.
C CA INT 0.5 AMPS BATT TRICKLE
C CONST INT 1.5 K CONSTANT
C EMISS INT 60 BTU/(HR=FT\*\*2) EARTH EMISSION
C \*\*\*\*\*

CONT. ON PG 2

PG 1 OF 19

ORIGINAL PAGE IS
OF POOR QUALITY

EPSLON	INT	0.75 (DIMENSIONLESS)	CONV. RAD. CONST.
		0.73 (DIMENSIONLESS)	OSR. RAD. CONST.
ETAT	INT		KATR EFFICIENCY
HPT	0		(BTU/HR) TOTAL HEATER POWER

HTPIPE	0		(BTU/HR) HEAT DUE TO H.P.
HTPT	0		(BTU/HR) TOTAL HEAT PIPE
HTAPRB	0		(BTU/HR) BATT. HEATER POWER
HTRPHR	0		(BTU/HR) OTHER HEATER POWER

I	INT		INDEX
IBTLOC	I		BATTERY LOCATION
ICONF	INT		TYPE OF CONFIG.
ISATOR	U	1 (DIMENSIONLESS)	EARTH ORIENTED
		2 (DIMENSIONLESS)	SUN ORIENTED
		3 (DIMENSIONLESS)	INERTIALLY ORI.

NC			NUMBER BATT CEL
NCONF(1)	I		S+C MACRO INDEX
NCONF(6)	I		VS MACRO INDEX
ORBINC	U		DEGREES ORBIT INCLINAT.

PCM	0		KG PHASE CHANGE MASS
PIE	INT	3.14159265	CONSTANT
PMAX	INT (08)		WATTS PWR MAX
PMIN	INT (08)		WATTS PWR MIN

QMAX	INT		(BTU/HR) MAX PWR DISSAP.
QMAXB	INT		(BTU/HR) BATT. POWER MAXIMUM
QMIN	INT		(BTU/HR) MIN PWR DISSAP.
QMINB	INT		(BTU/HR) BATT. POWER MINIMUM

QS	INT	442.0 BTU/(HR*FT**2)	SOLAR CONST.
----	-----	----------------------	--------------

CONT. ON PG 3

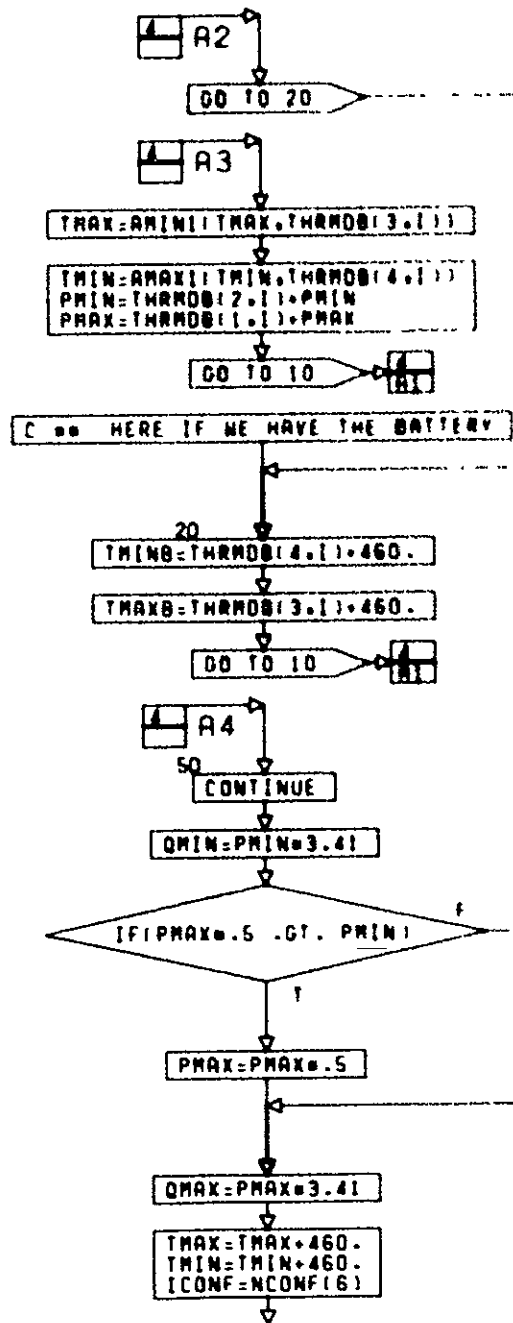
PG 2 OF 19

ORIGINAL PAGE IS  
OF POOR QUALITY





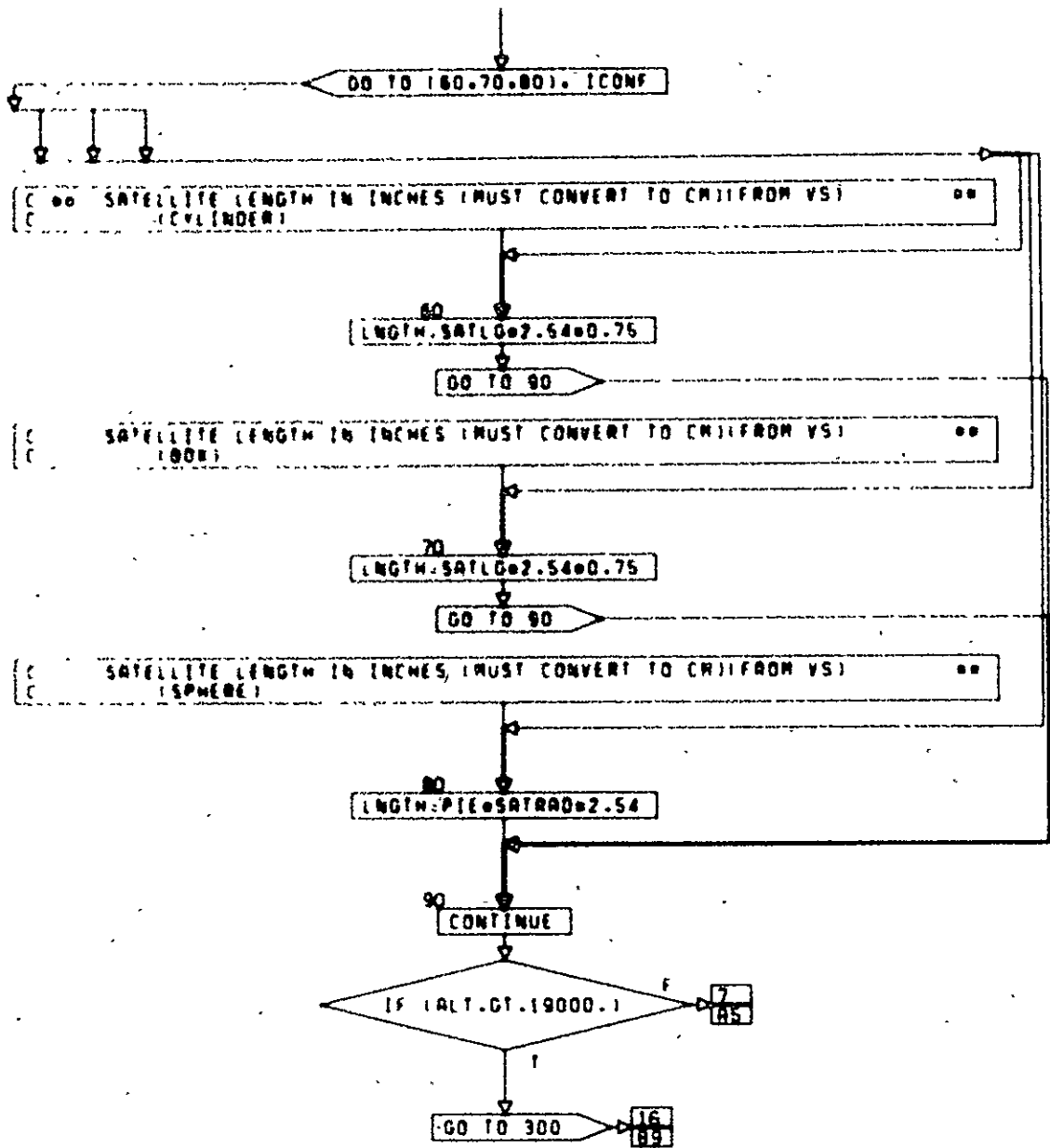




CONT. ON PG 6

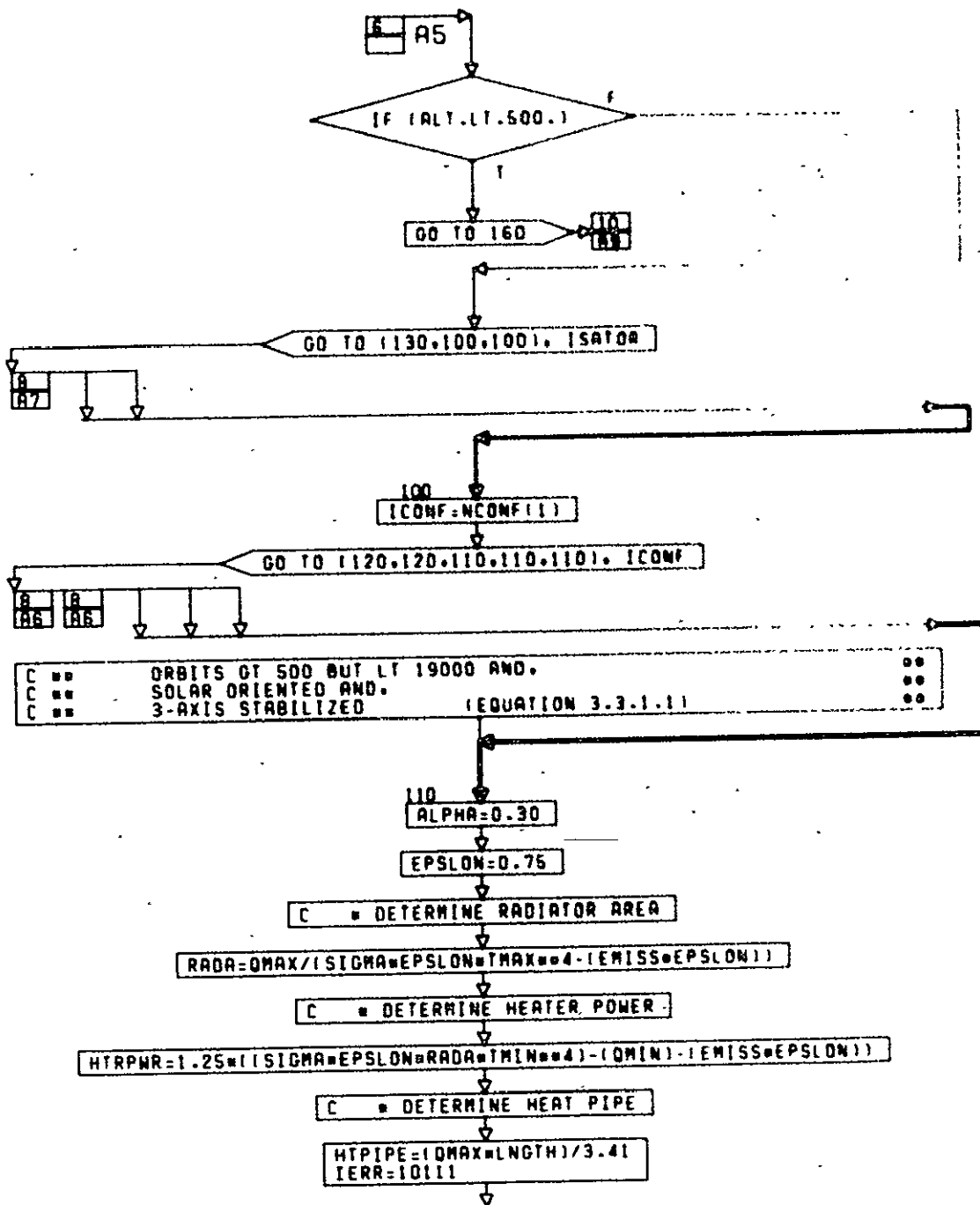
PG 5 OF 19

044



CONT. ON PG 7

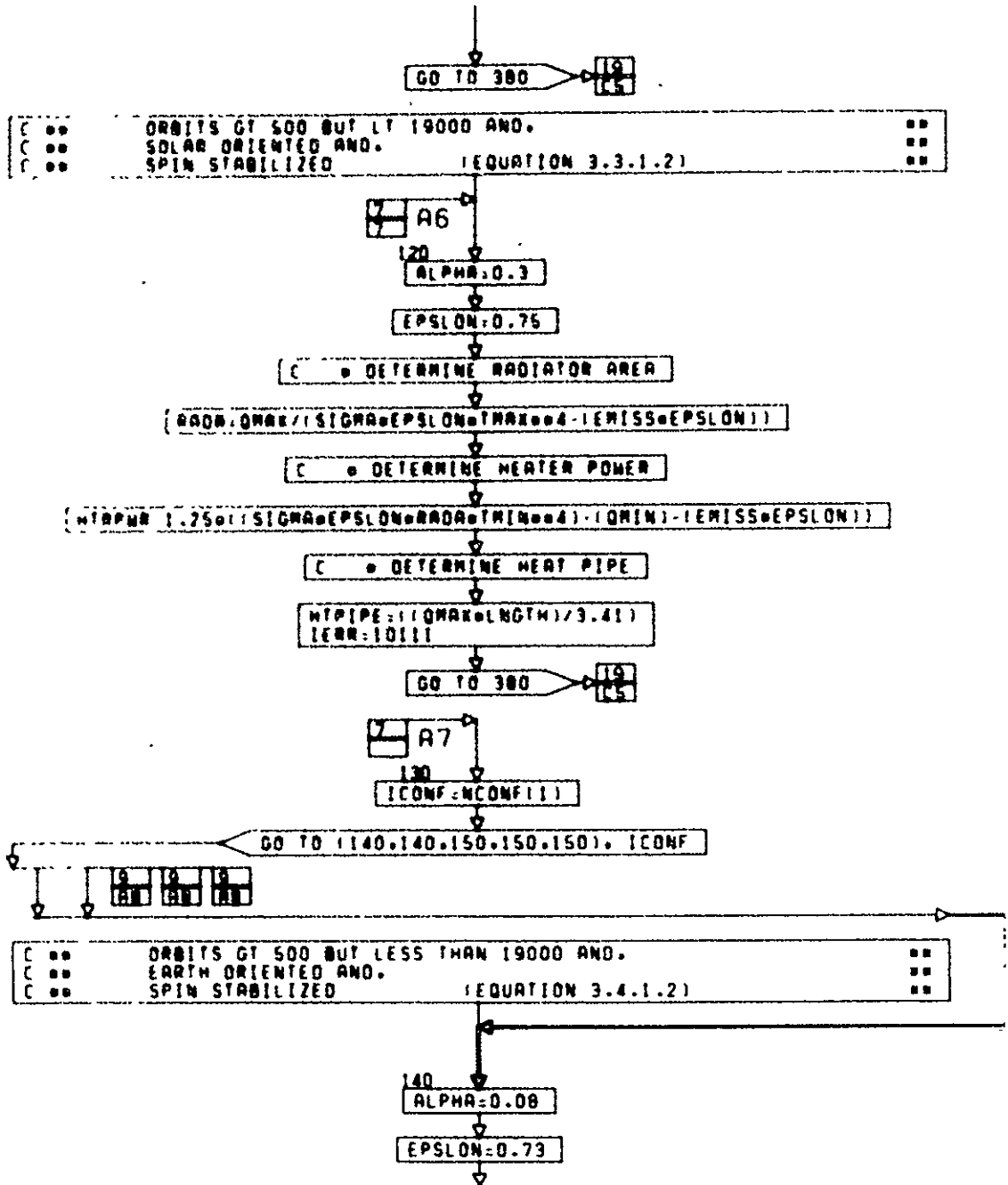
PG 6 OF 19



CONT. ON PG 8

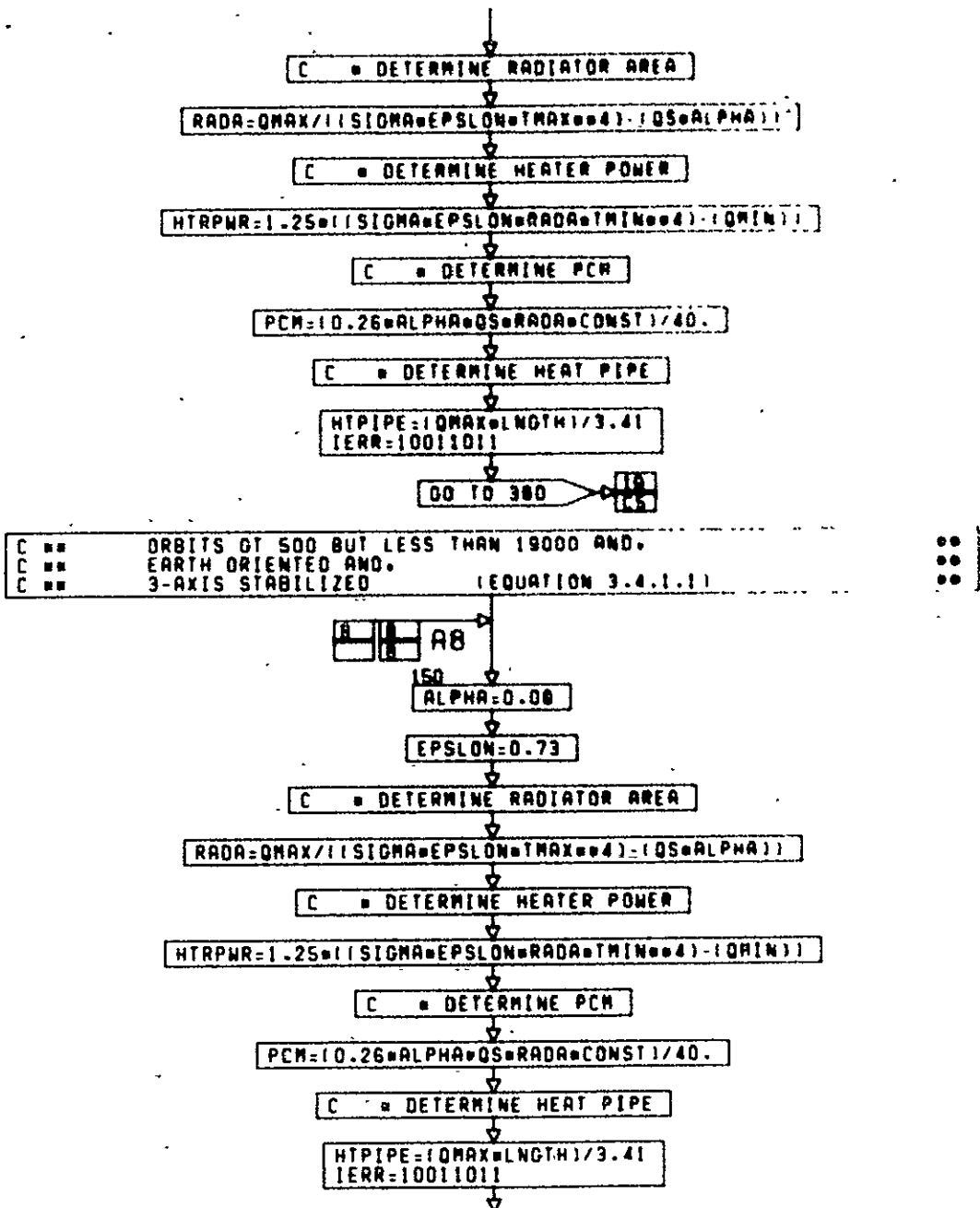
PG 7 OF 19

045



CONT. ON PG 9

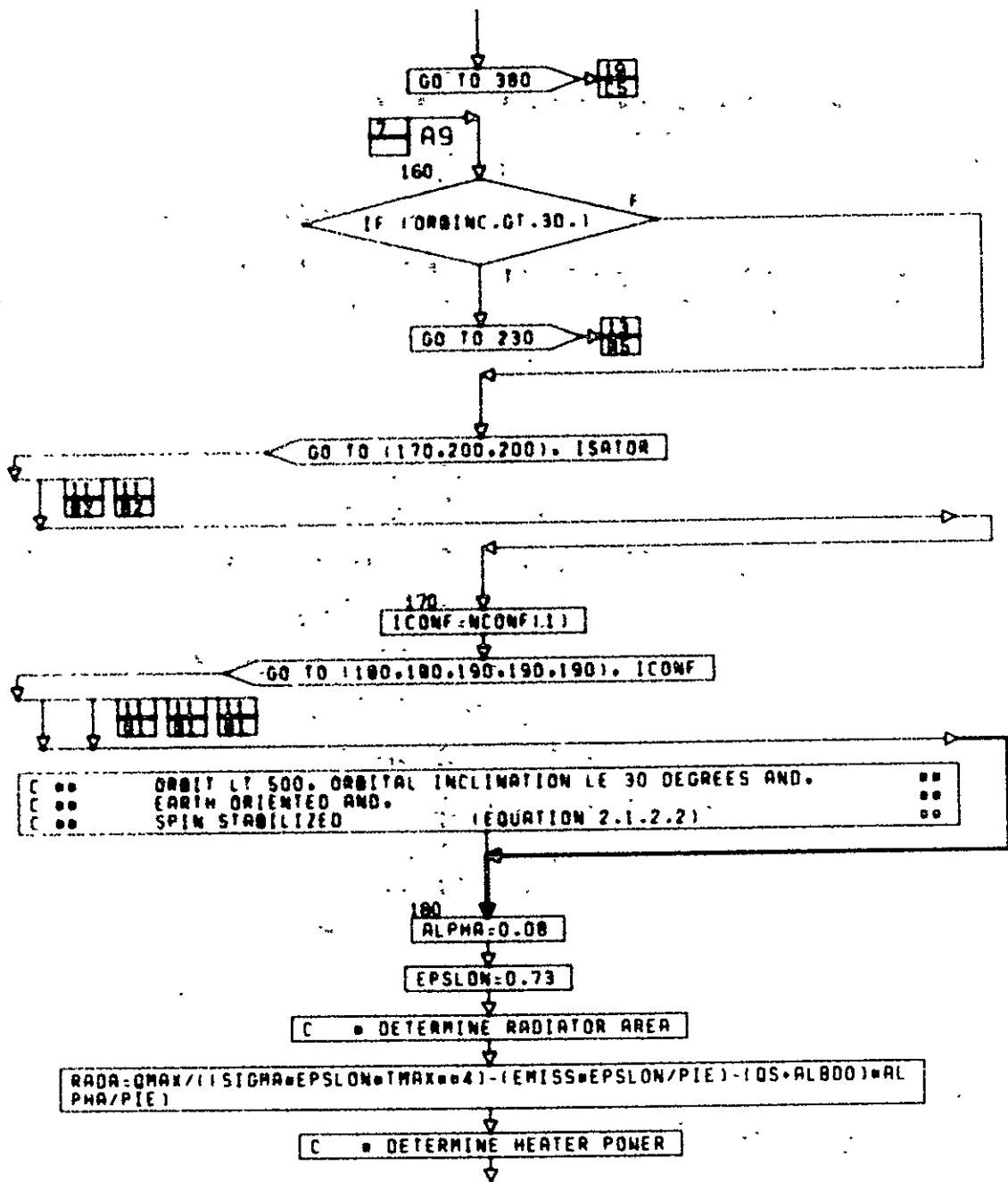
PG 8 OF 19



CONT. ON PG 10

PG 9 OF 19

046



CONT. ON PG 11

PG 100F 19



HTRPWR=1.25\*((SIGMA\*EPSLON\*RADA\*TM(NOO4)) / (OMIN) \* ((EMISS\*EPSLON) / (PI \* E)))

IERR=1011

GO TO 380

C == ORBIT LT 500, ORBITAL INCLINATION LE 30 DEGREES AND.     ::  
 C == EARTH ORIENTED AND,     ::  
 C == 3-AXIS STABILIZED     (EQUATION 2.1.2.1)     ::

10 110 B1

198 ALPHA=0.08

EPSLON=0.73

C = DETERMINE RADIATOR AREA

RADA=QMAX / ((SIGMA\*EPSLON\*TMAX\*\*4) - (ALPHA\*QS\*\*4))

C DETERMINE HEATER POWER

HTRPWR=1.25\*((SIGMA\*EPSLON\*RADA\*TM(NOO4)) / (OMIN))

C = DETERMINE PCM MASS

PCM=10.26\*QS\*RADA\*(ALPHA\*CONST) / 40.

C = DETERMINE ISOTHERMALIZER HEAT PIPE

HPIPE=(QMAX\*LN(TH)) / 3.41  
 IERR=11011011

GO TO 380

10 110 B2

200 ICONF=NCONF(1)

GO TO (210,210,220,220,220), ICONF

12 12 12 12 12  
 B3 B3 B4 B4 B4

C ● ORBIT LT 500, ORBITAL INCLINATION LE 30 DEGREES AND. ●●  
 C ● SUN ORIENTED AND. ●●  
 C ● SPIN STABILIZED (EQUATION 2.1.1.2) ●●

B3

210

ALPHA=0.00

EPSLON=0.73

C ● DETERMINE RADIATOR AREA

RADA=QMAX/((SIGMA\*EPSLON\*TMAX\*\*4)-(EMISS\*EPSLON)-(ALBDO\*ALPHA))

C ● DETERMINE HEATER POWER

HTRPWR=1.25\*((SIGMA\*EPSLON\*RADA\*TMIN\*\*4)-QMIN)

C ● DETERMINE HEAT PIPES

HPIPE=(QMAX\*LNGM)/3.41  
 IERR=10011

GO TO 300

19  
15

C ● ORBIT LT 500, ORBITAL INCLINATION LE 30 DEGREES AND. ●●  
 C ● SUN ORIENTED AND. ●●  
 C ● 3 AXIS STABILIZED (EQUATION 2.1.1.1) ●●

B4

220

ALPHA=0.00

EPSLON=0.73

C ● DETERMINE RADIATOR AREA

RADA=QMAX/((SIGMA\*EPSLON\*TMAX\*\*4)-(EMISS\*EPSLON)-(ALBDO\*ALPHA))

C ● DETERMINE HEATER POWER

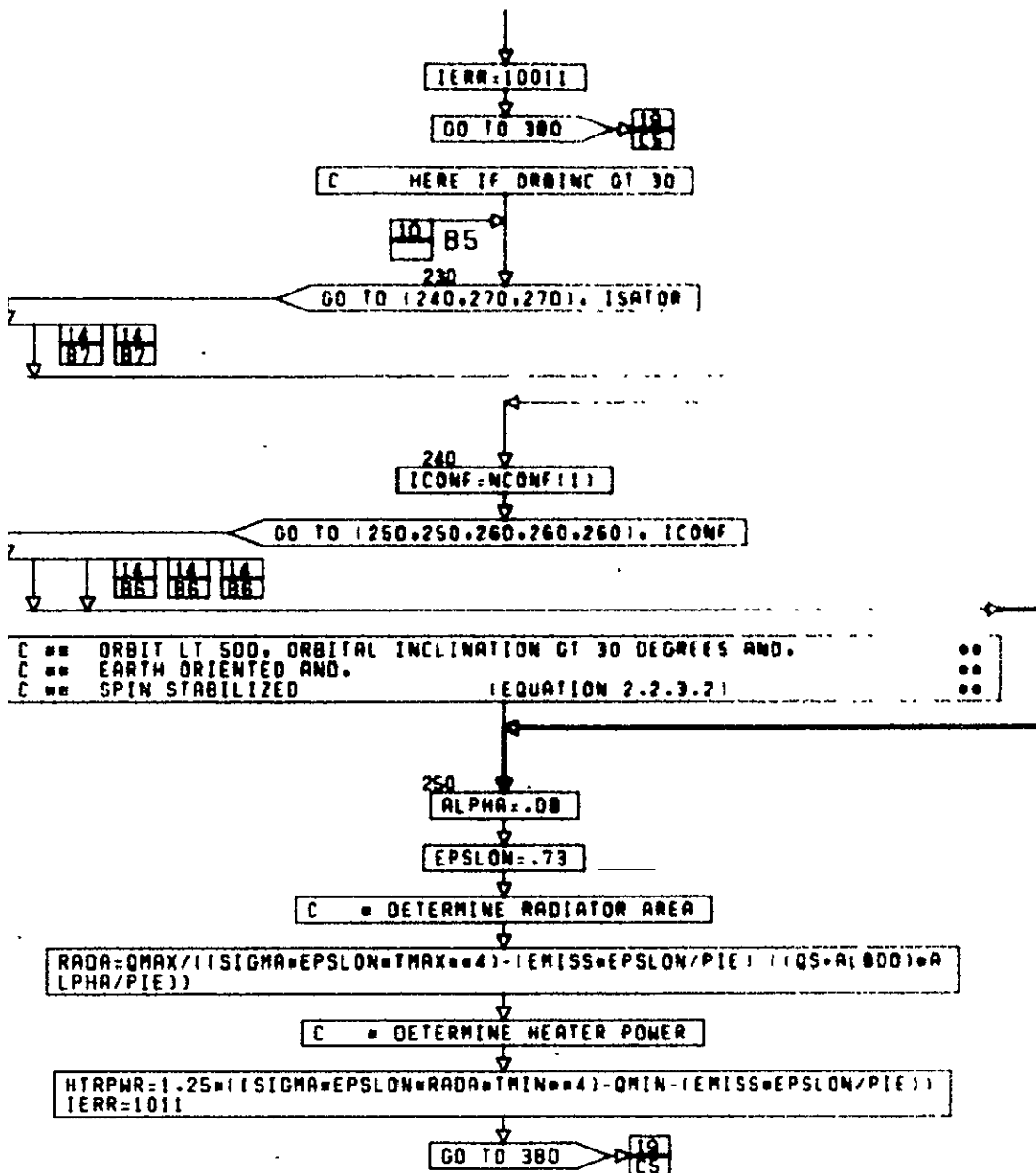
HTRPWR=1.25\*((SIGMA\*EPSLON\*RADA\*TMIN\*\*4)-QMIN)

C ● DETERMINE HEAT PIPES

HPIPE=(QMAX\*LNGM)/3.41

CONT. ON PG 13

PG 12F 19



CONT. ON PG 14

PG 10F 19

048

C \*\* ORBIT LT 500, ORBITAL INCLINATION GT 30 AND. \*\*  
 C \*\* EARTH ORIENTED AND. \*\*  
 C \*\* 3 AXIS STABILIZED (EQUATION 2.2.3.1) \*\*

13 13 13  
 13 13 13  
 86

280  
 ALPHA=.08

EPSLON=.73

C \* DETERMINE RADIATOR AREA

RADA=QMAX/(SIGMA\*EPSLON\*(TAX\*\*4)-(ALPHA\*QS))

C \* DETERMINE HEATER POWER

HTRPWR=1.25\*(SIGMA\*(EPSLON\*RADA\*(TIN\*\*4)-QIN))

C \* DETERMINE PCR MASS

PCR=10.26\*QS\*ALPHA\*RADA\*CONST/40.

C \* DETERMINE ISOTHERMALIZER HEAT PIPE

HPIPE=(QMAX\*LN(TH)/3.41  
 IERR=11011011

GO TO 380

13 13 13  
 13 13 13  
 87

270  
 (CONF=NCONF(I))

GO TO (280,280,290,290,290), (CONF

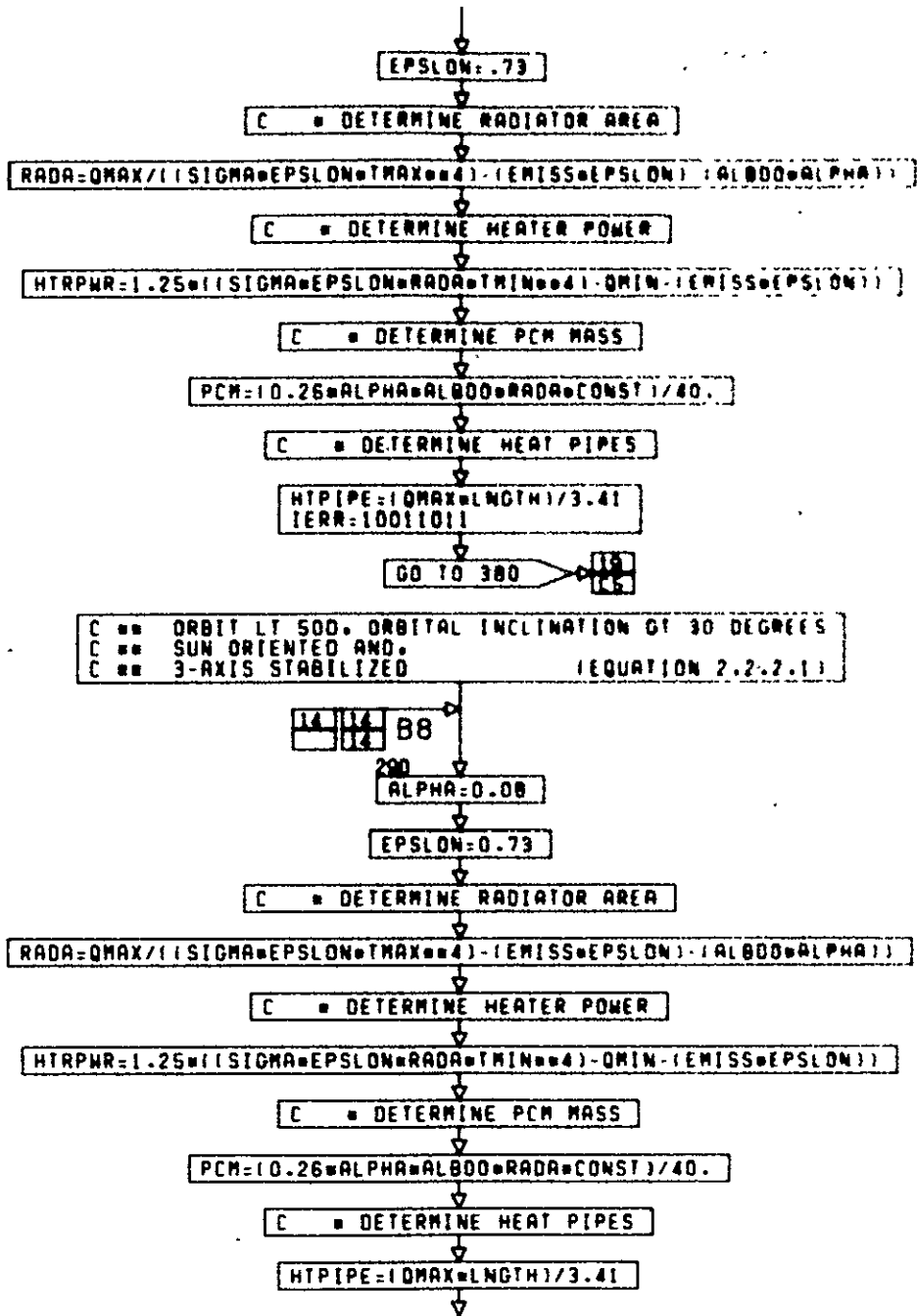
15 15 15  
 15 15 15

C \*\* ORBIT LT 500, ORBITAL INCLINATION GT 30 AND. \*\*  
 C \*\* SUN ORIENTED AND. \*\*  
 C \*\* SPIN STABILIZED (EQUATION 2.2.2.2) \*\*

280  
 ALPHA=.08

CONT. ON PG 15

PG 14 OF 19



C == ORBIT LT 500, ORBITAL INCLINATION OF 30 DEGREES  
 C == SUN ORIENTED AND.  
 C == 3-AXIS STABILIZED (EQUATION 2.2.2.1)

B8

ALPHA=0.08

EPSILON=0.73

C = DETERMINE RADIATOR AREA

RADA=QMAX/((SIGMA\*EPSILON\*TMAX\*\*4)-(EMISS\*EPSILON)\*(ALBDO\*ALPHA))

C = DETERMINE HEATER POWER

HTRPWR=1.25\*((SIGMA\*EPSILON\*RADA\*TMIN\*\*4)-QMIN-(EMISS\*EPSILON))

C = DETERMINE PCM MASS

PCM=(0.26\*ALPHA\*ALBDO\*RADA\*CONST)/40.

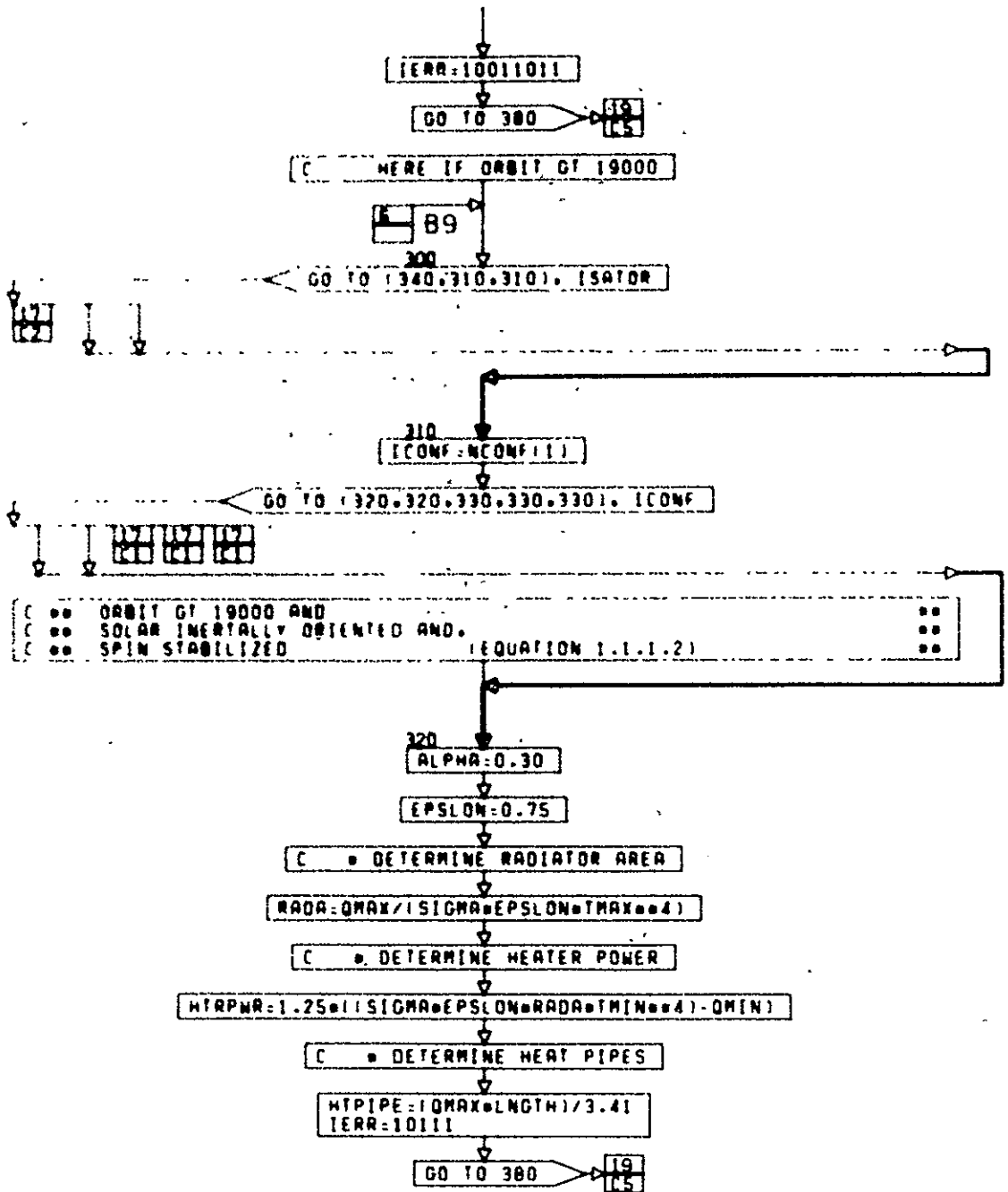
C = DETERMINE HEAT PIPES

HTPIPE=(QMAX\*LN(TH))/3.41

CONT. ON PG 16

PG 15F 19

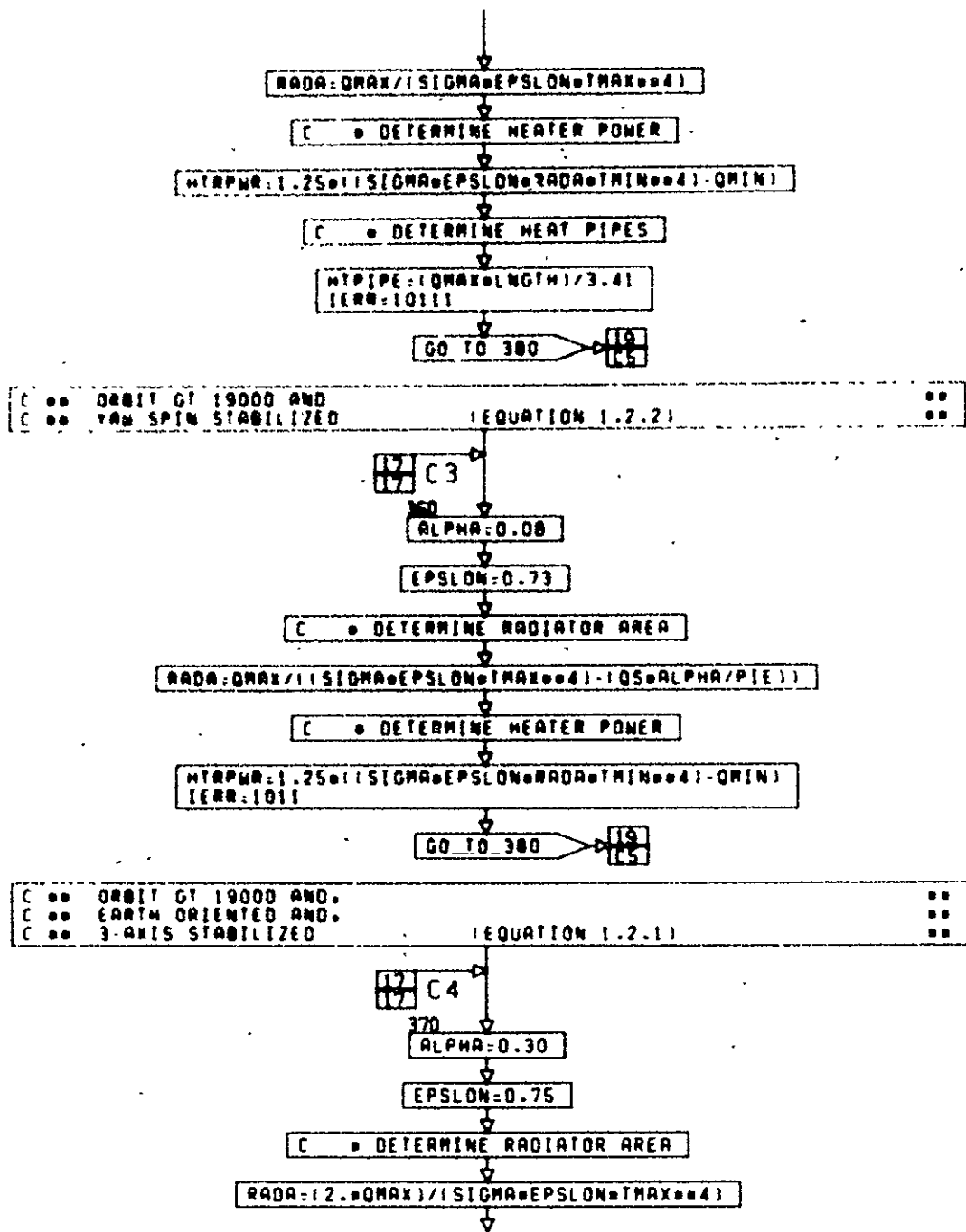
049



CONT. ON PG 17

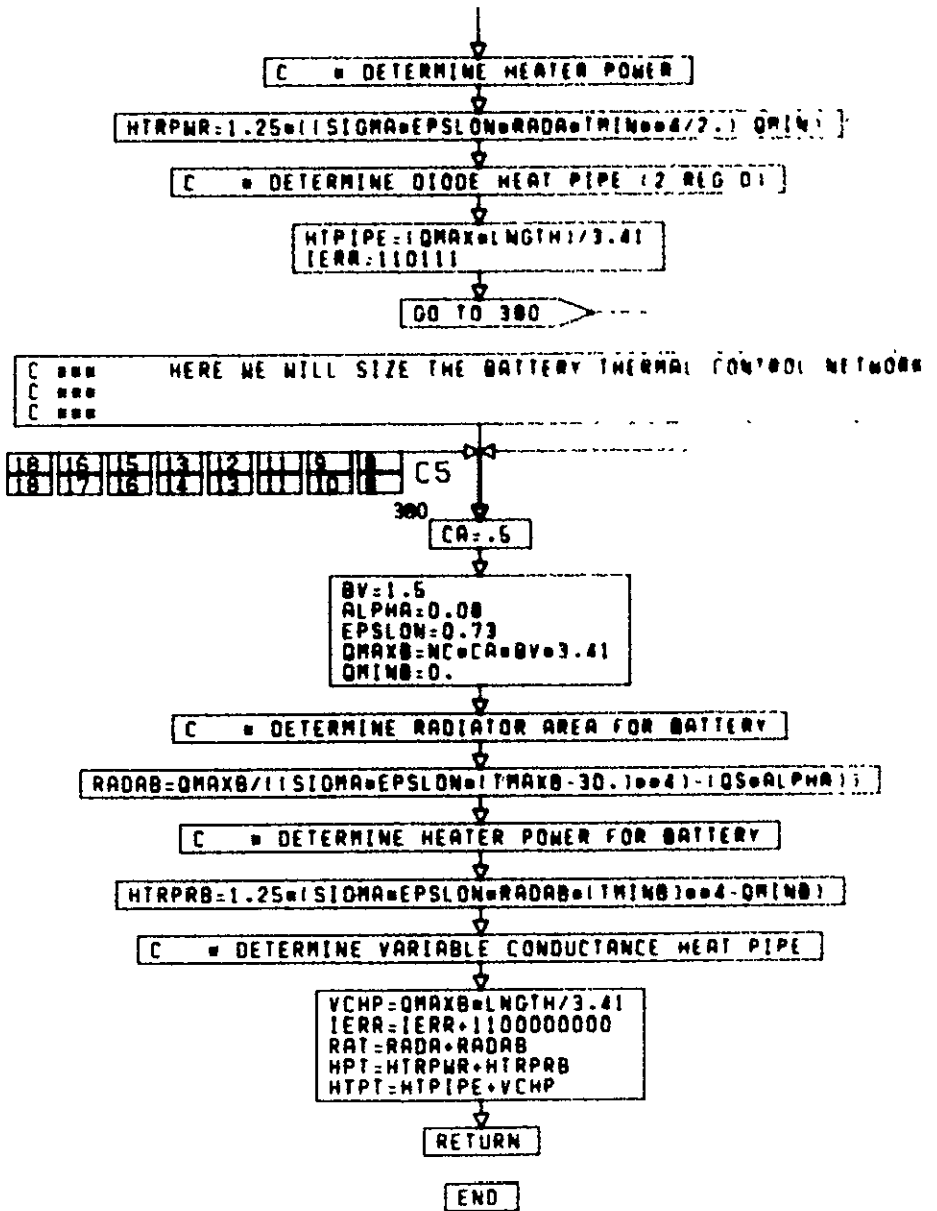
PG 18 OF 19





CONT. ON PG 19





```
SUBROUTINE COMM (IPIC, IERR, ITER, MCONF, ICHOSE, NCHOSE)
INTEGER RESET, SEQ, SSS, GRP
REAL LMARG, NF, MODLOS, IBER
```

```
DIMENSION IPIC(9), ICHOSE(11), NCHOSE(11), KPIC(9), MCONF(6),
KCHOSE(11)
```

```
DIMENSION SIGMOI(12), LMARG(2), TCLOSS(2), GT(2), MODX(2)
DIMENSION BER(14,3), IBER(14), BESSJI(2), LIMPIC(9)
```

```
COMMON /USER4/ (OPTCN(3), IMSSEP, SEQ, LSOLS, LUSO, FREQ(2), APDGE,
NET, NADIR, FREQR, COMRAT, BM(DTM(2)))
```

```
COMMON /BTWN/ WT, VOL, DT, D, DX, DY, DZ, XJ, YJ, ZJ, RJ, FF, TI, PL, PLIN,
LMADD, AREA, SATLG, WATE, NC, ACSNP, HARNMT, TMCMT, CONVMT, TNKMT, PASSTA,
SATMT, TPRIM, IBTLOC, RADA, RADAB, RAT, HTRPWA, HTRPWB,
HPT, HTPPE, VCHP, HTP, FC, XNZERO, COMAT, ACSSW, BITRAT(2),
EQBLG, SABLG, SATMT
```

```
COMMON /DBCOM/ (DB(30), DATAB(55,90))
COMMON /USER1/ (EQM1WT, EQM2WT, DIAMAX, ALI)
```

```
EQUIVALENCE (J1, KPIC(1)), (J7, KPIC(6)), (J4, KPIC(7)), (J5, KPIC(8)),
(J6, KPIC(9))
```

```
INTEGER SEQ, SSS, GRP
```

```
DATA SIGMOI /10.,10./, LMARG /6.,6./, SLANT /-1.E10/,
GTOT /-1.E10/, GR /-1.E10/, T /-1.E10/, NF /1.E10/,
TCLOSS /0.,0./, POLOSS /0./, GAMMA /.1/, BETA /1.0/,
GT /-1.E10,-1.E10/, MODX /0.,0/, ANTLOS /0./,
COVER /0./, GRP /0/
```

```
C BER IS BIT ERROR RATE DEGRADATION DUE TO HARDWARE
C IBER IS ARRAY OF DATA RATES
```

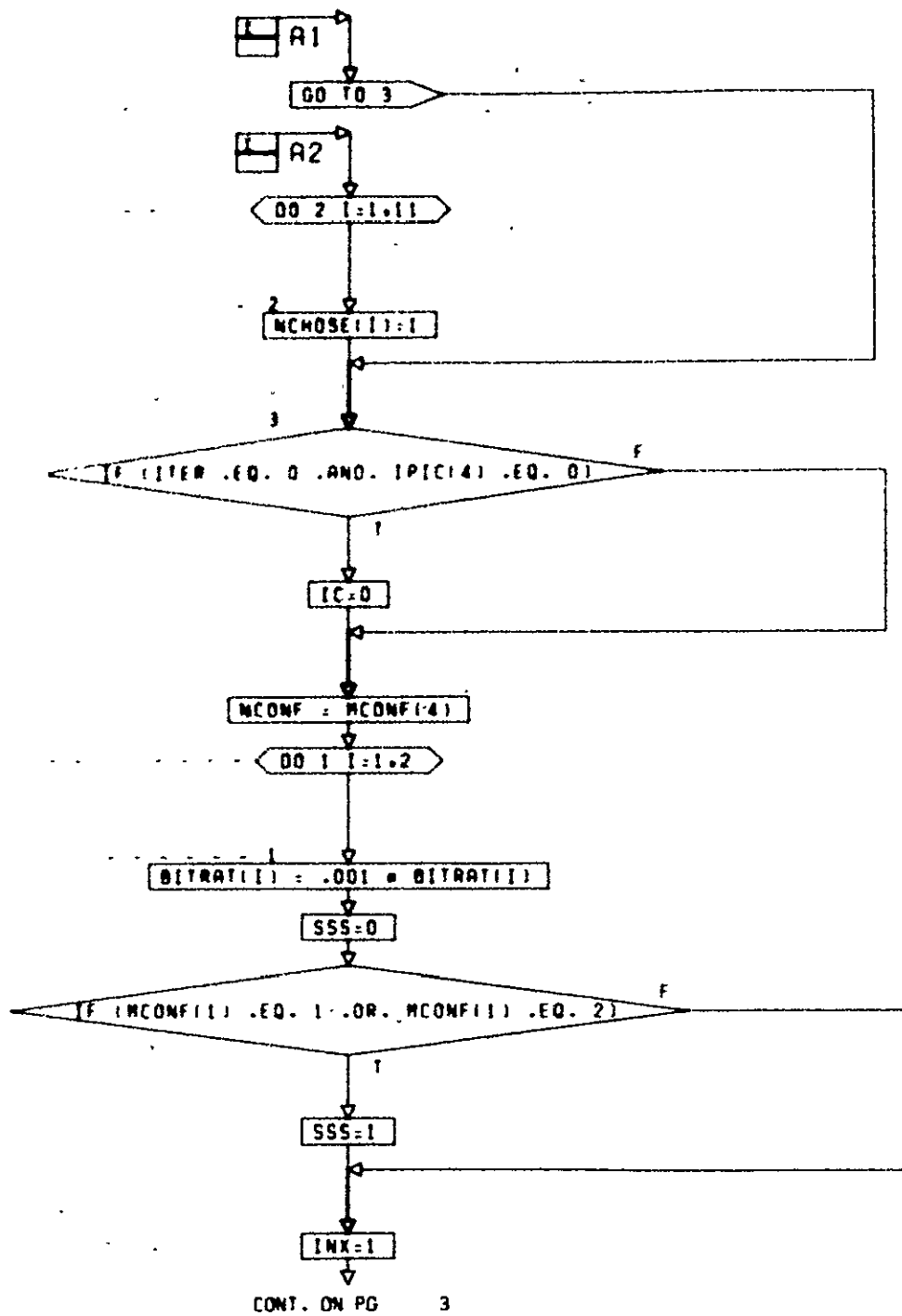
```
DATA IBER/.25.,.50.,1.0,2.0,4.0,8.0,16.,32.,64.,128.,256.,512.,768.,
1024./
```

```
DATA BER/8=4.4,4.6,5=5.5,8=2.4,2.4,2.5,4=3.3,10=4.0,3.9,
3.3,3.4,4.1/
```

```
DATA IB1/6/, IB2/9/, IB3/11/, IA1/10/, IT1/11/, IT2/6/, IT3/12/, IT4/13/,
IT5/7/, IT6/14/, IT7/9/, IT8/8/, IT9/10/, IT10/15/, IR1/6/, IR2/10/, IR3/1
5/, IC1/7/, IC2/6/, IC3/12/, ID1/6/, ID2/11/
```

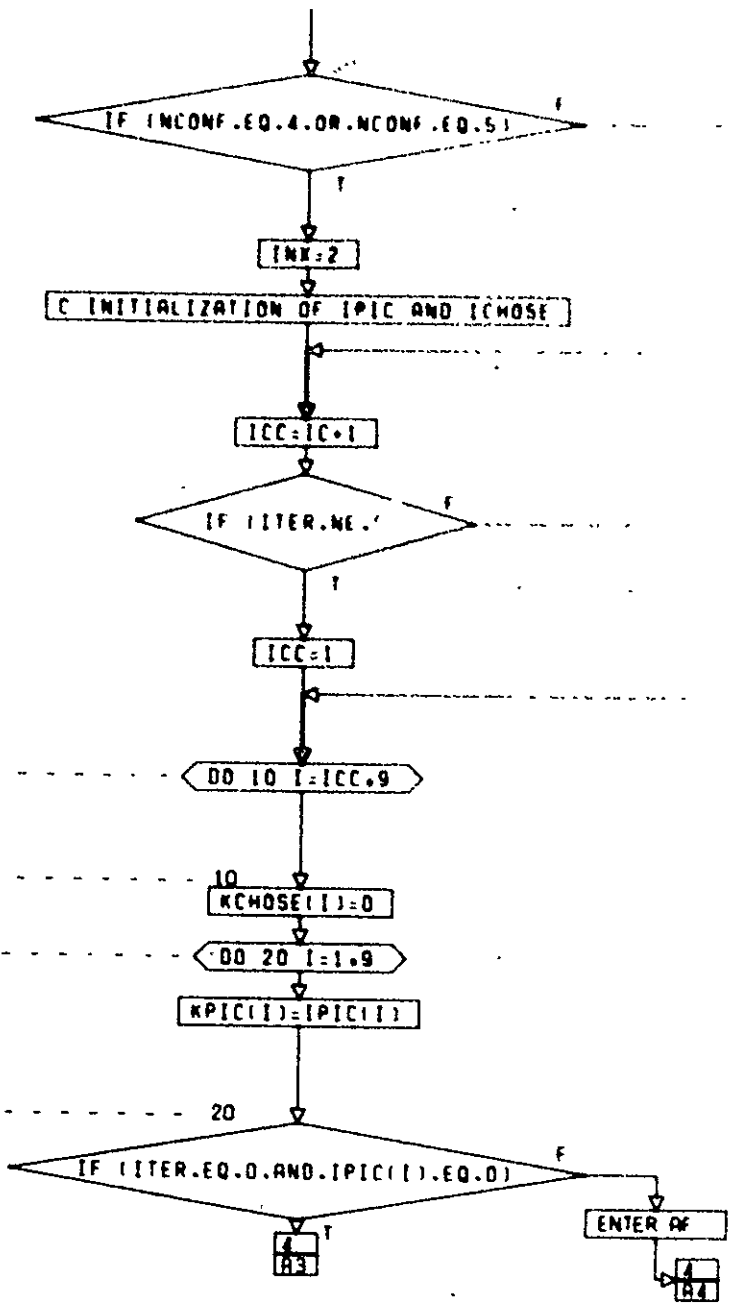


CONT. ON PG 2



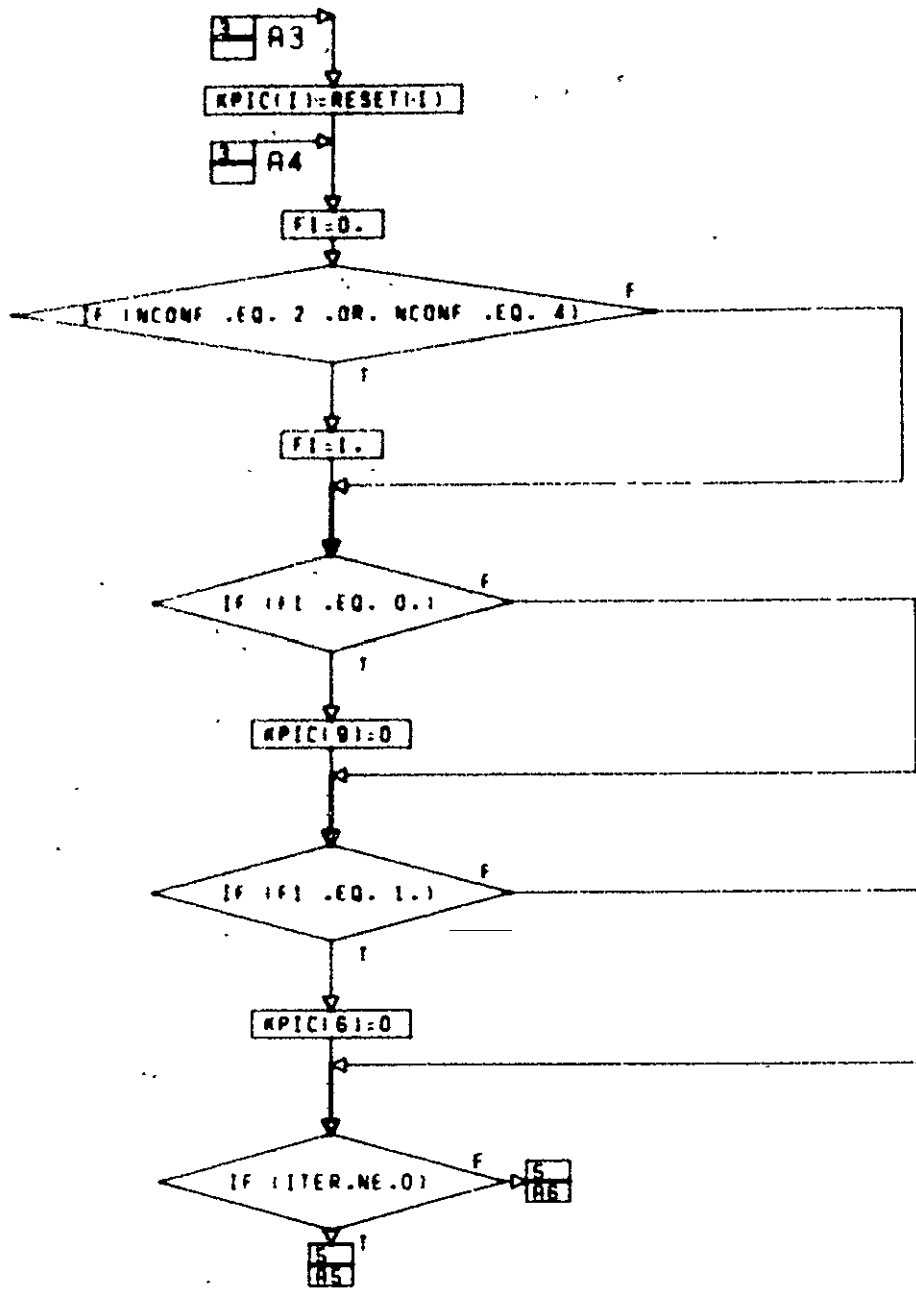
CONT. ON PG 3

PG 2 OF 52



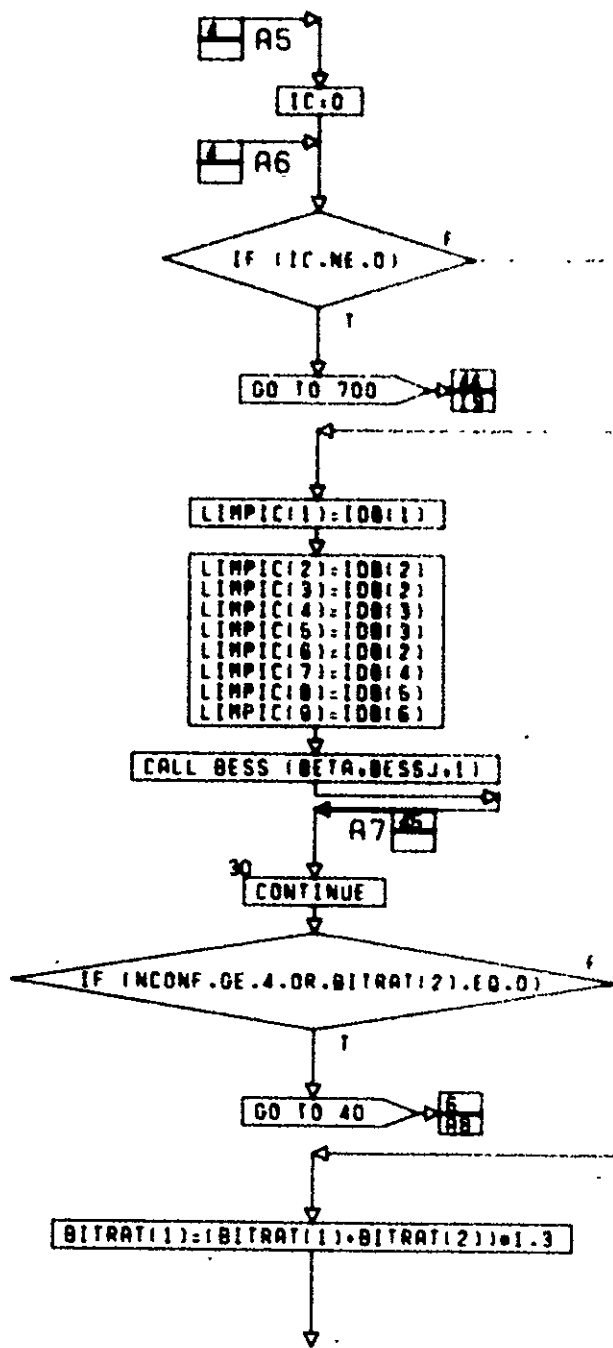
CONT. ON PG 4

PG 3 OF 52



CONT. ON PG 5

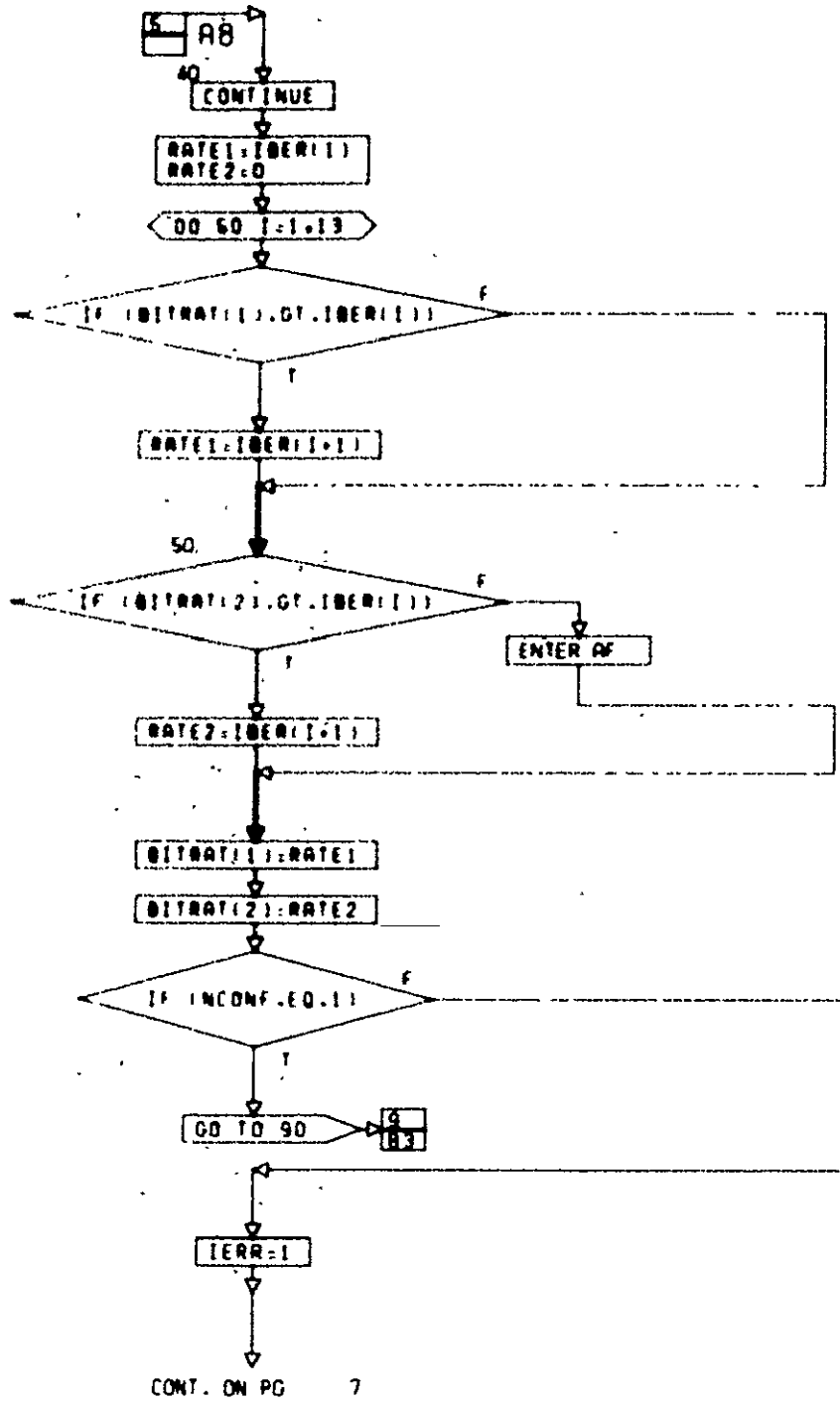
PG 4 OF 52

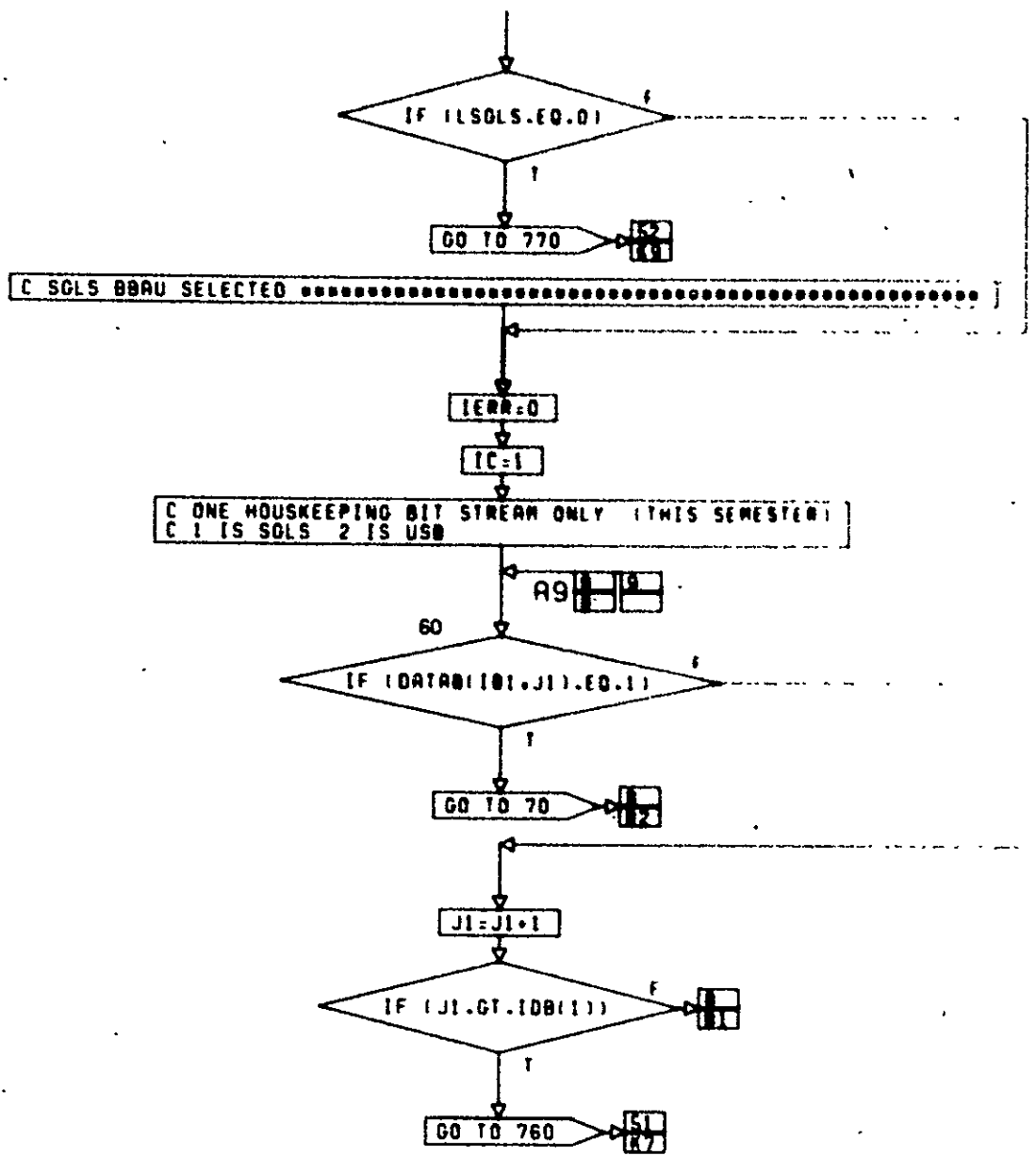


CONT. ON PG 6

PG 5 OF 52

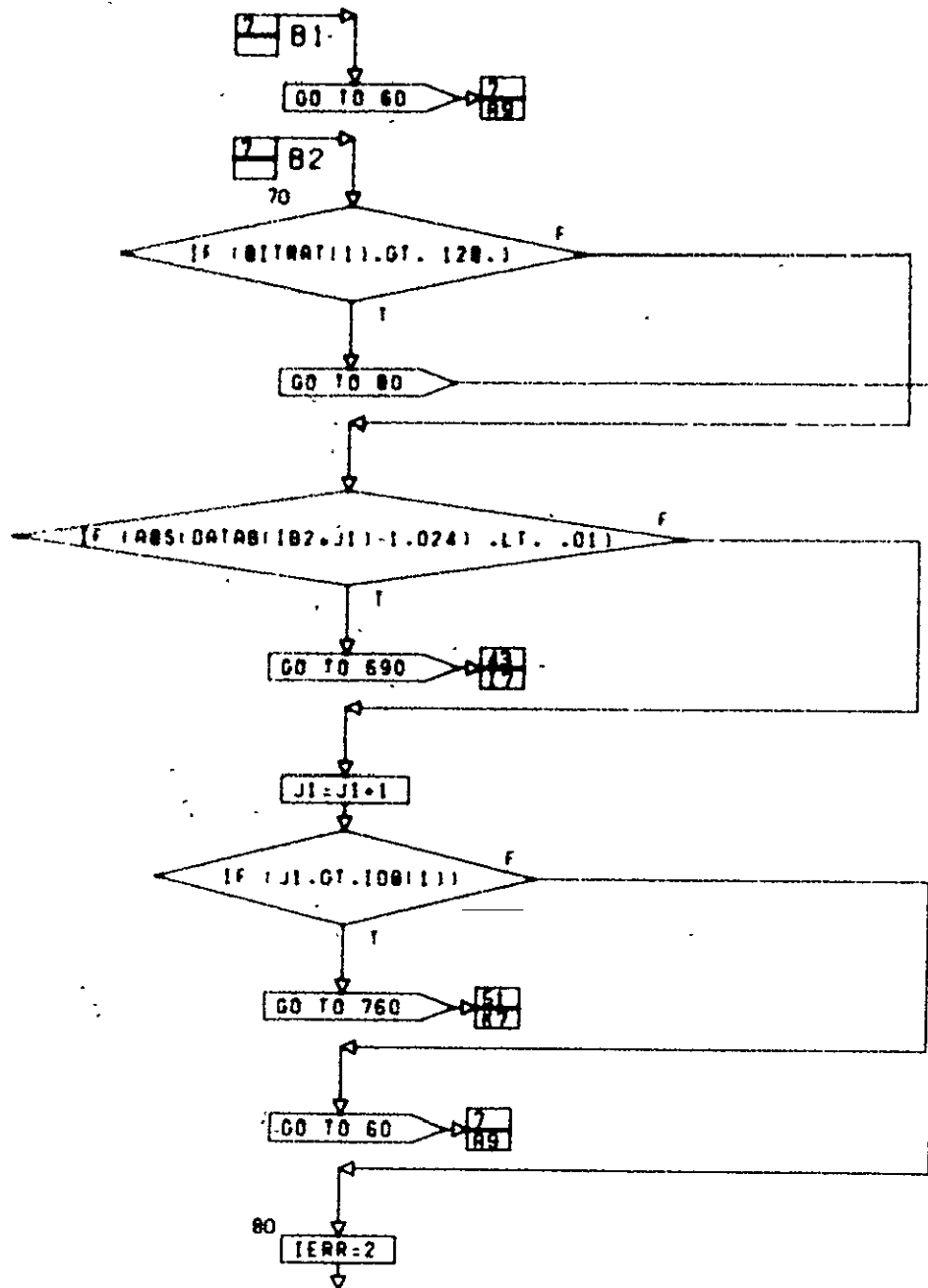
935





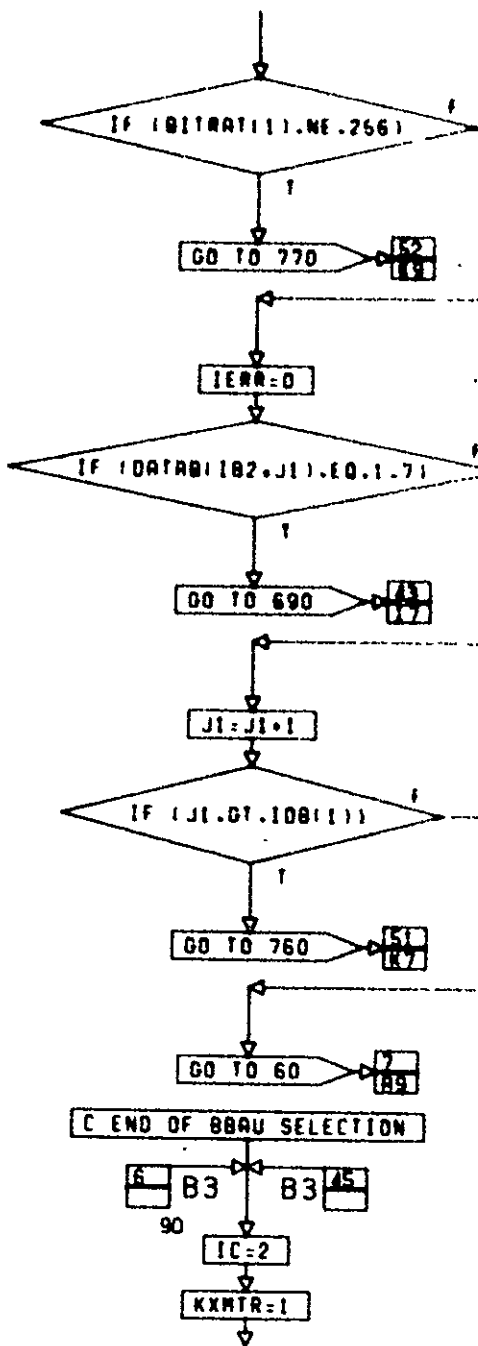
CONT. ON PG 8





CONT. ON PG 9

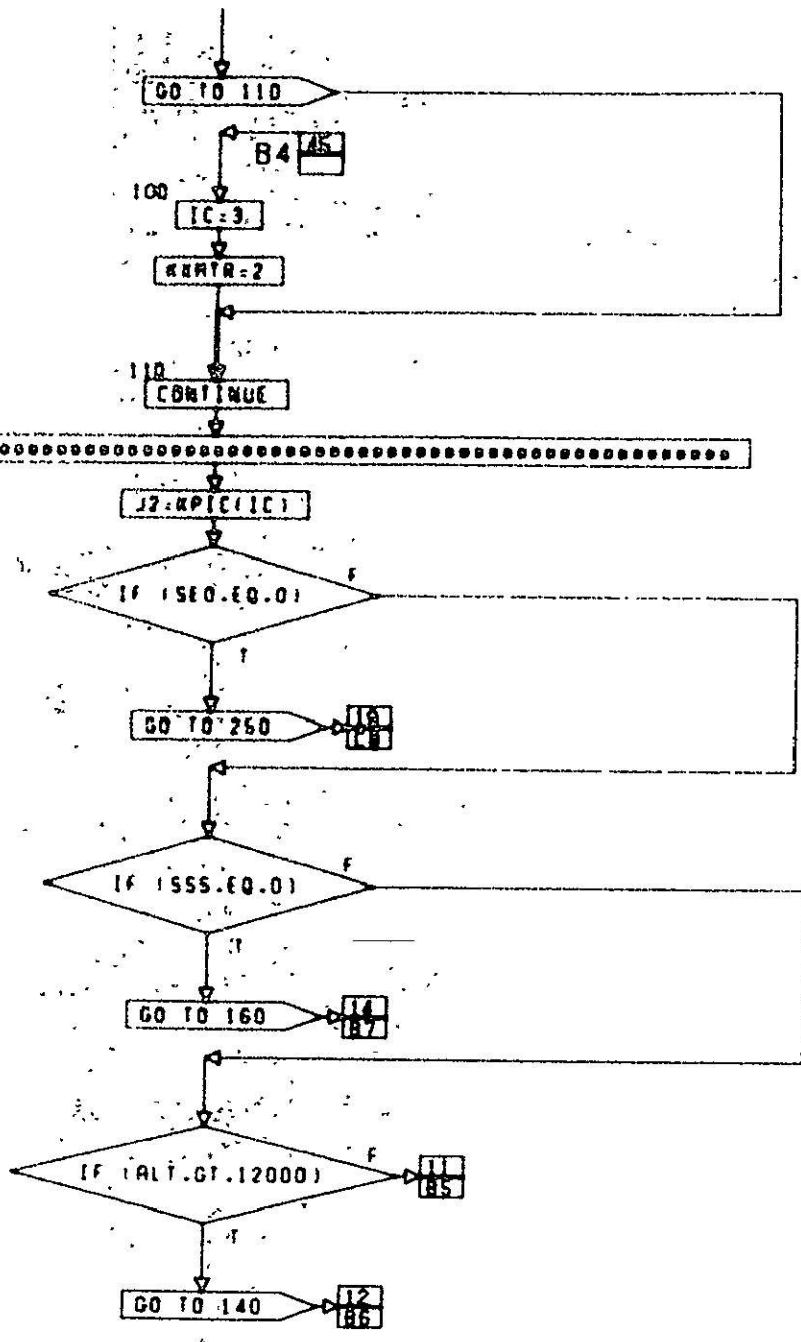
PG 8 OF 52



CONT. ON PG 10

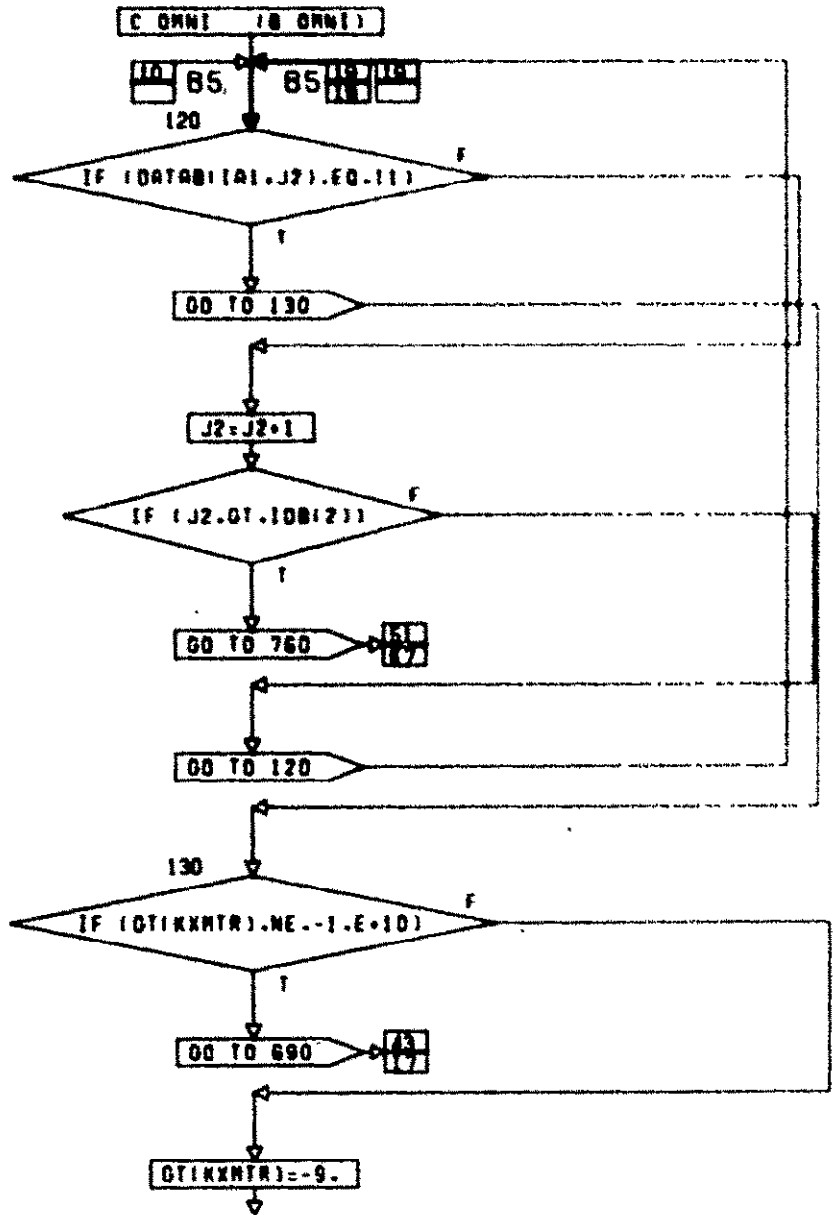
PG 9 OF 52

157



CONT. ON PG 11

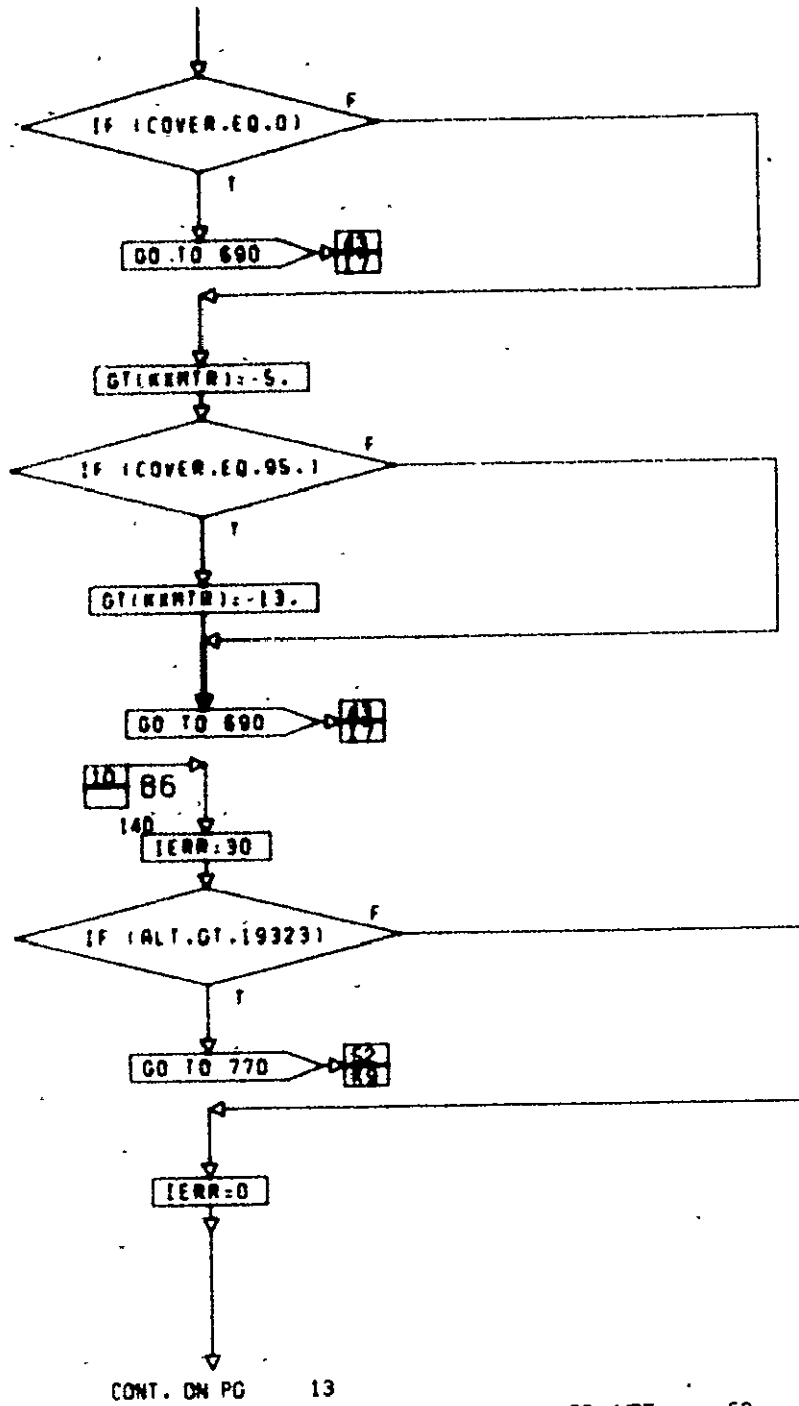
PG 100F 52



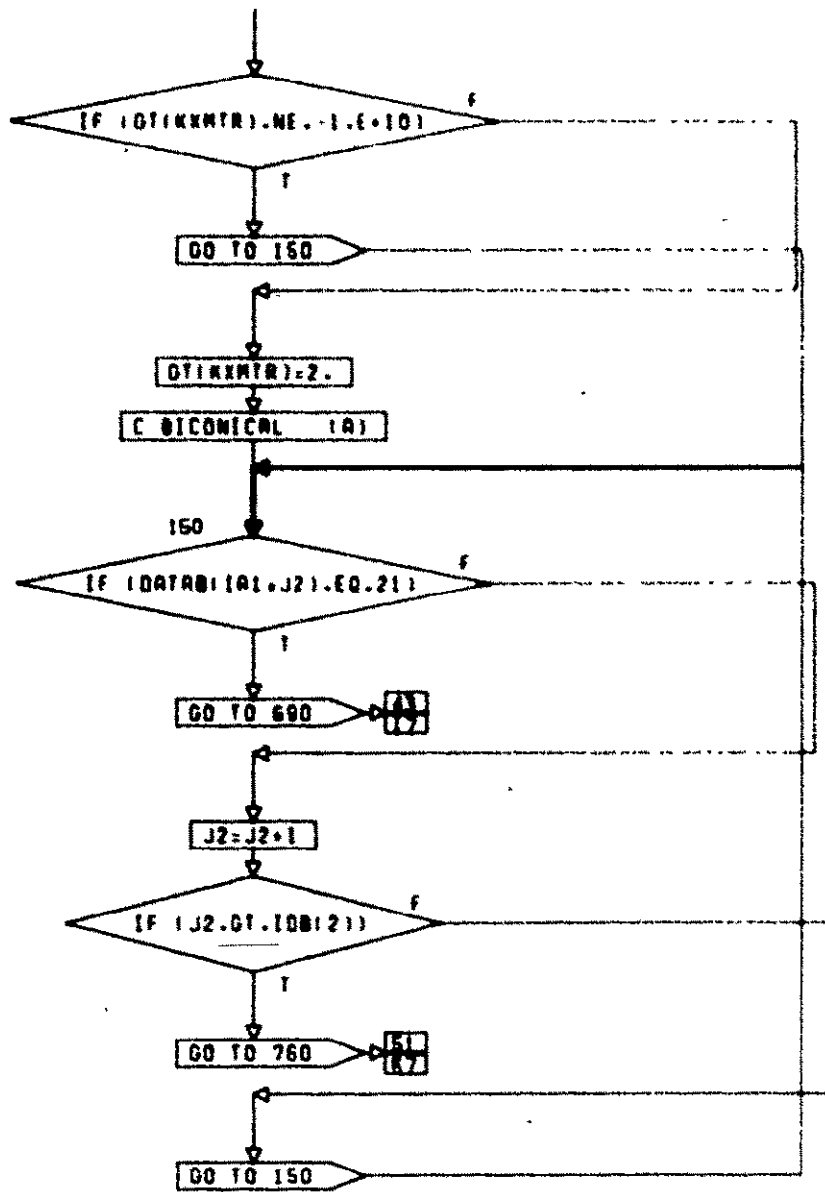
CONT. ON PG 12

PG 11F 52

020



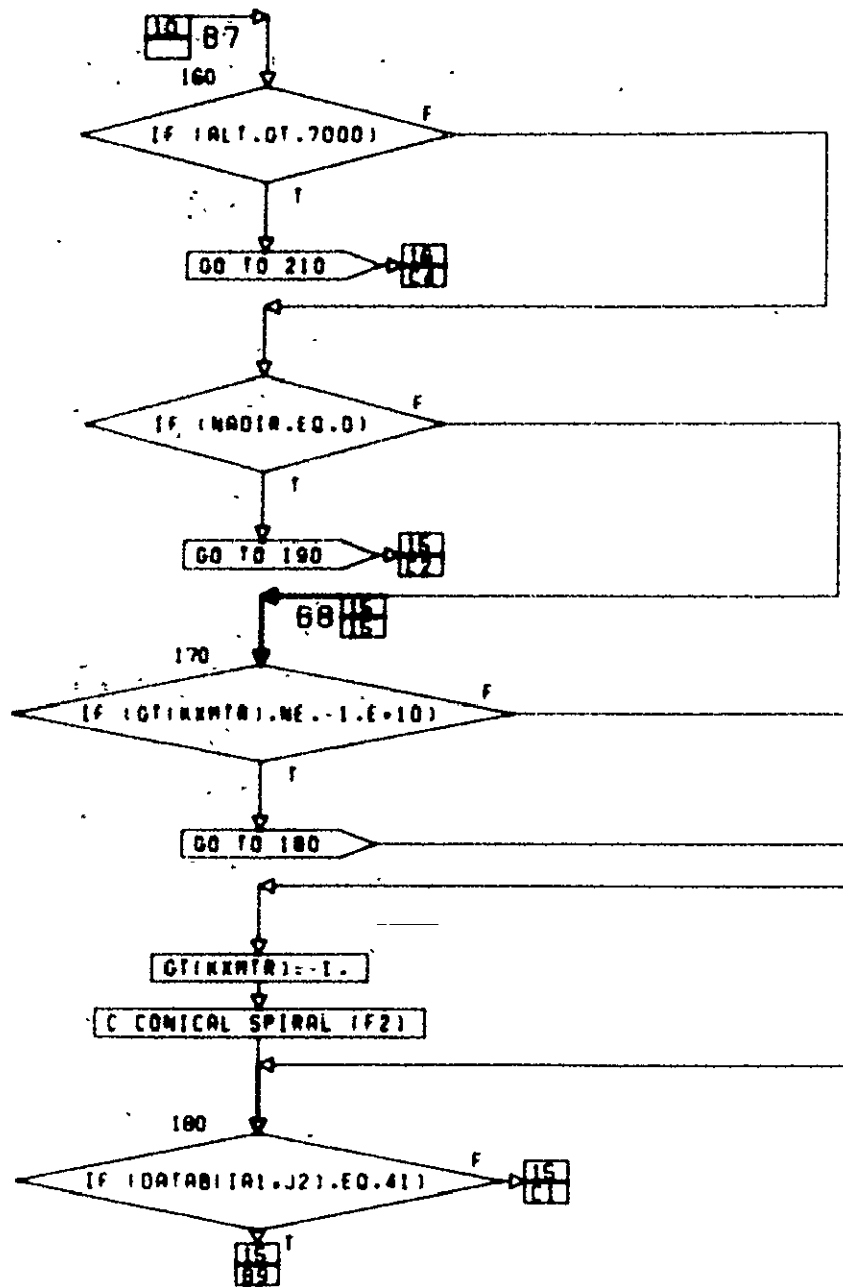
0-5



CONT. ON PG 14

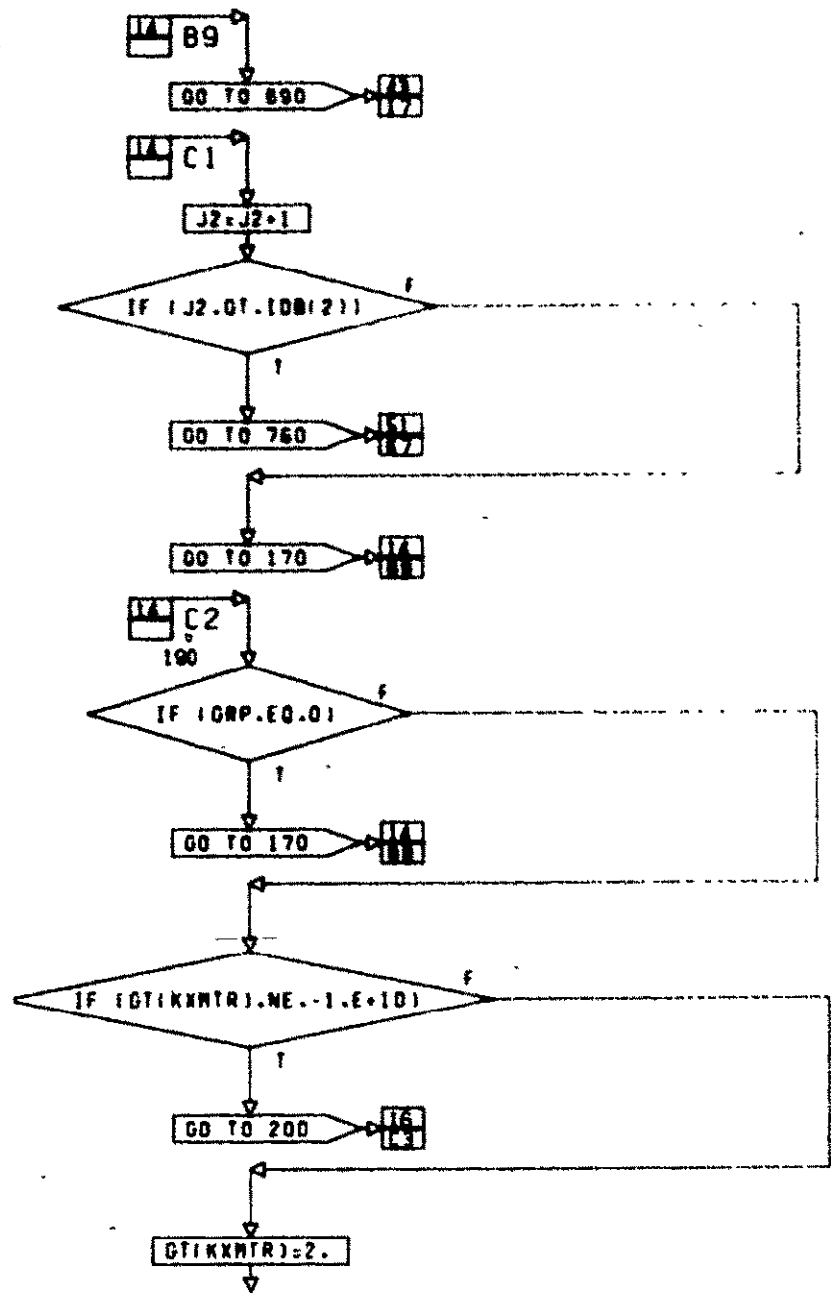
PG 1 OF 52

150



CONT. ON PG 15

PG 14 OF 52

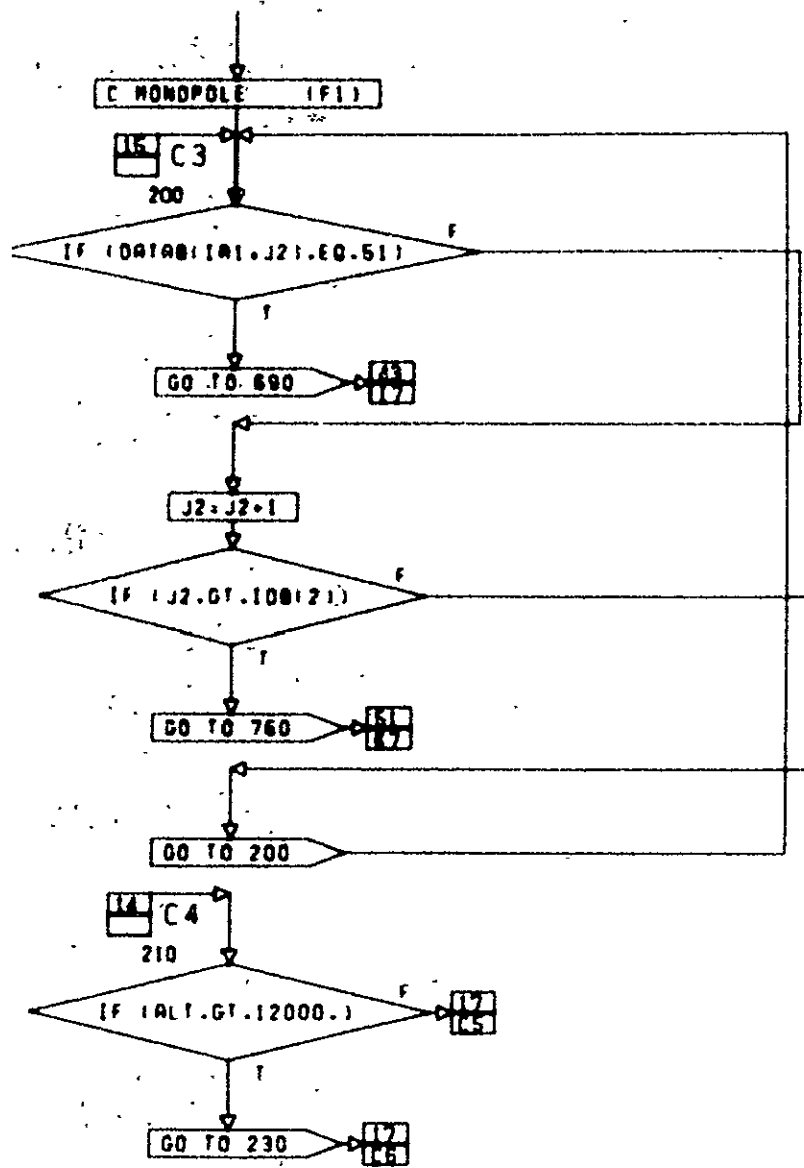


CONT. ON PG 16

PG 150F 52

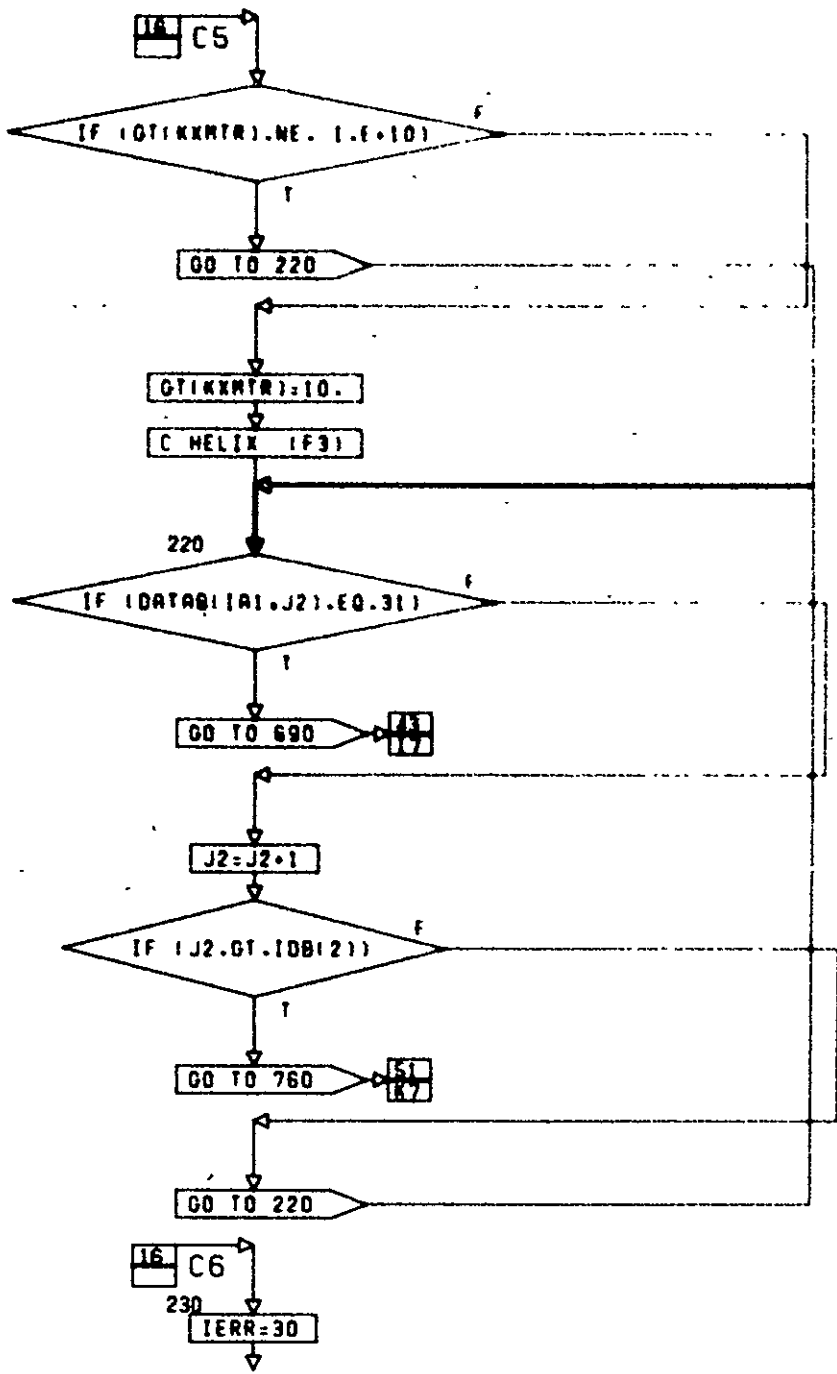
000





CONT. ON PG 17

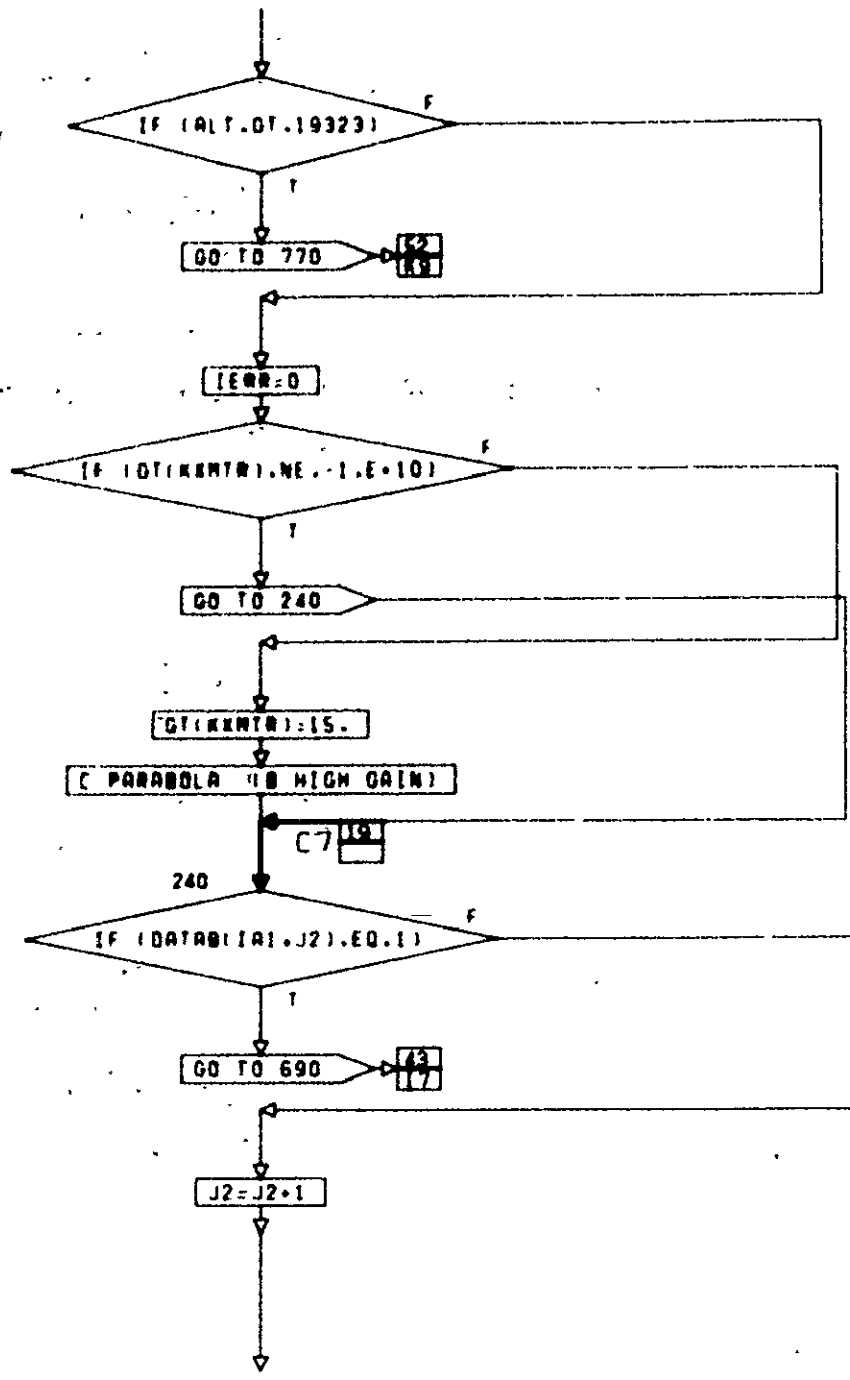
PG 10F 52



CONT. ON PG 18

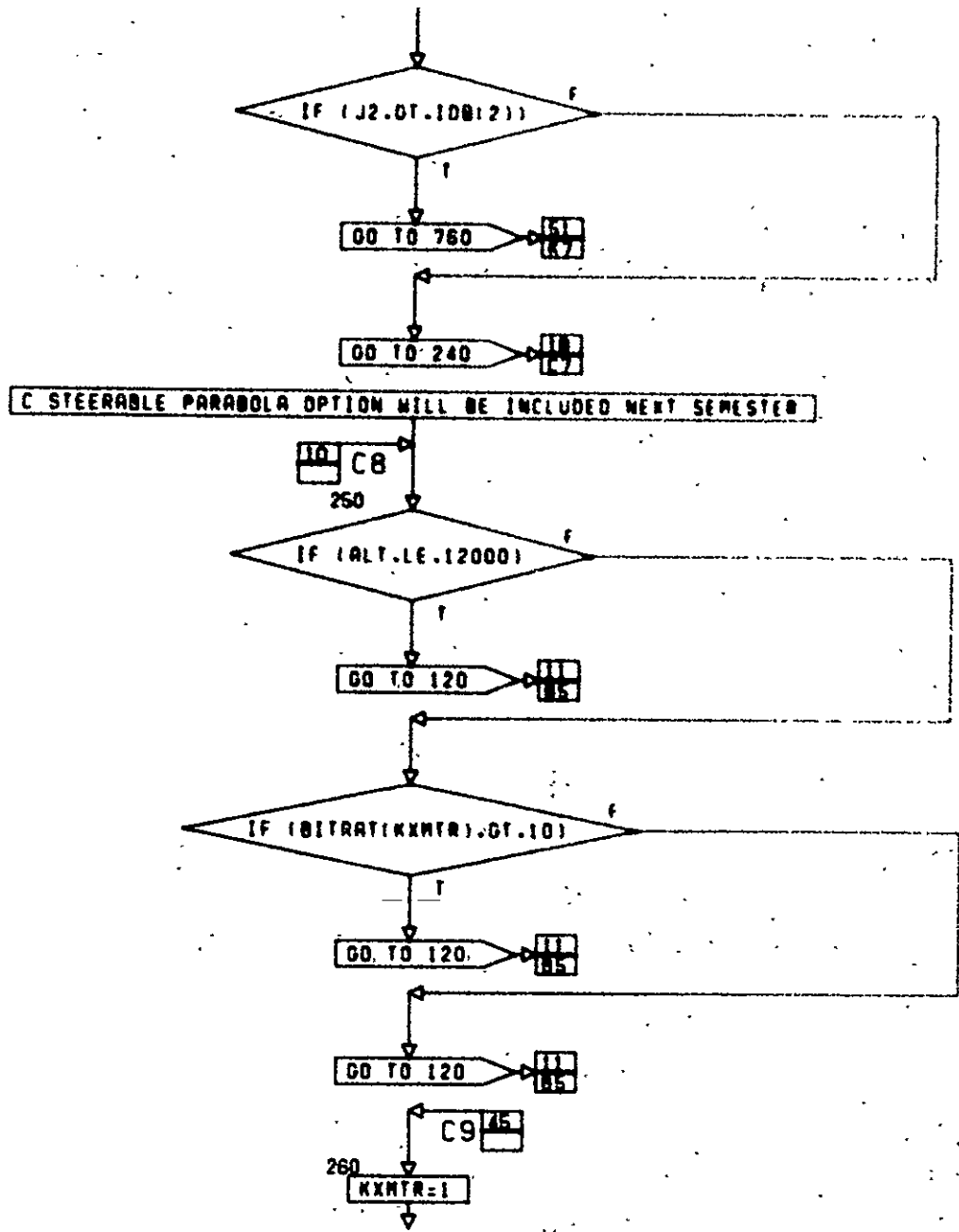
PG 18F 52

001



CONT. ON PG 19

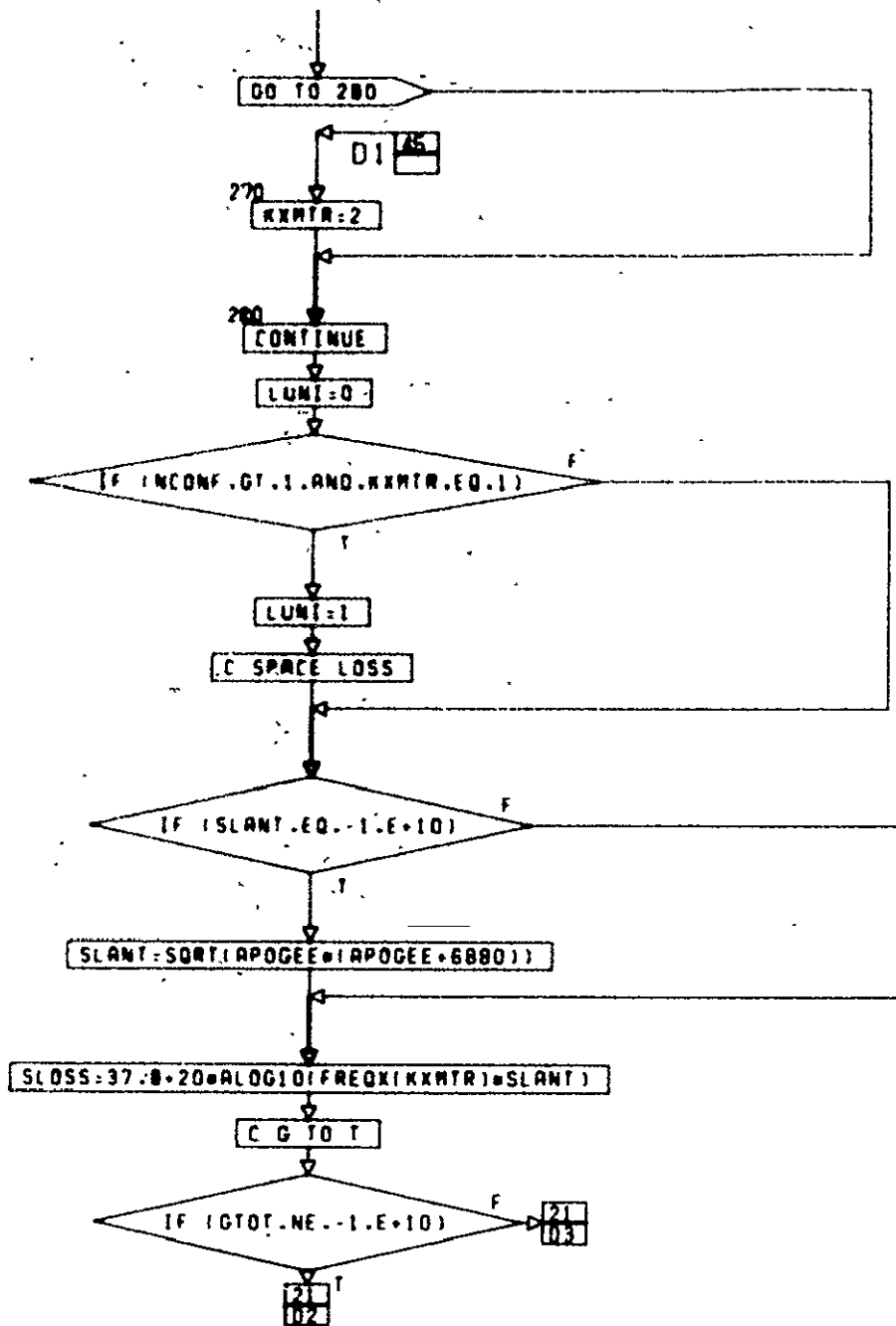
PG 18 OF 52



CONT. ON PG 20

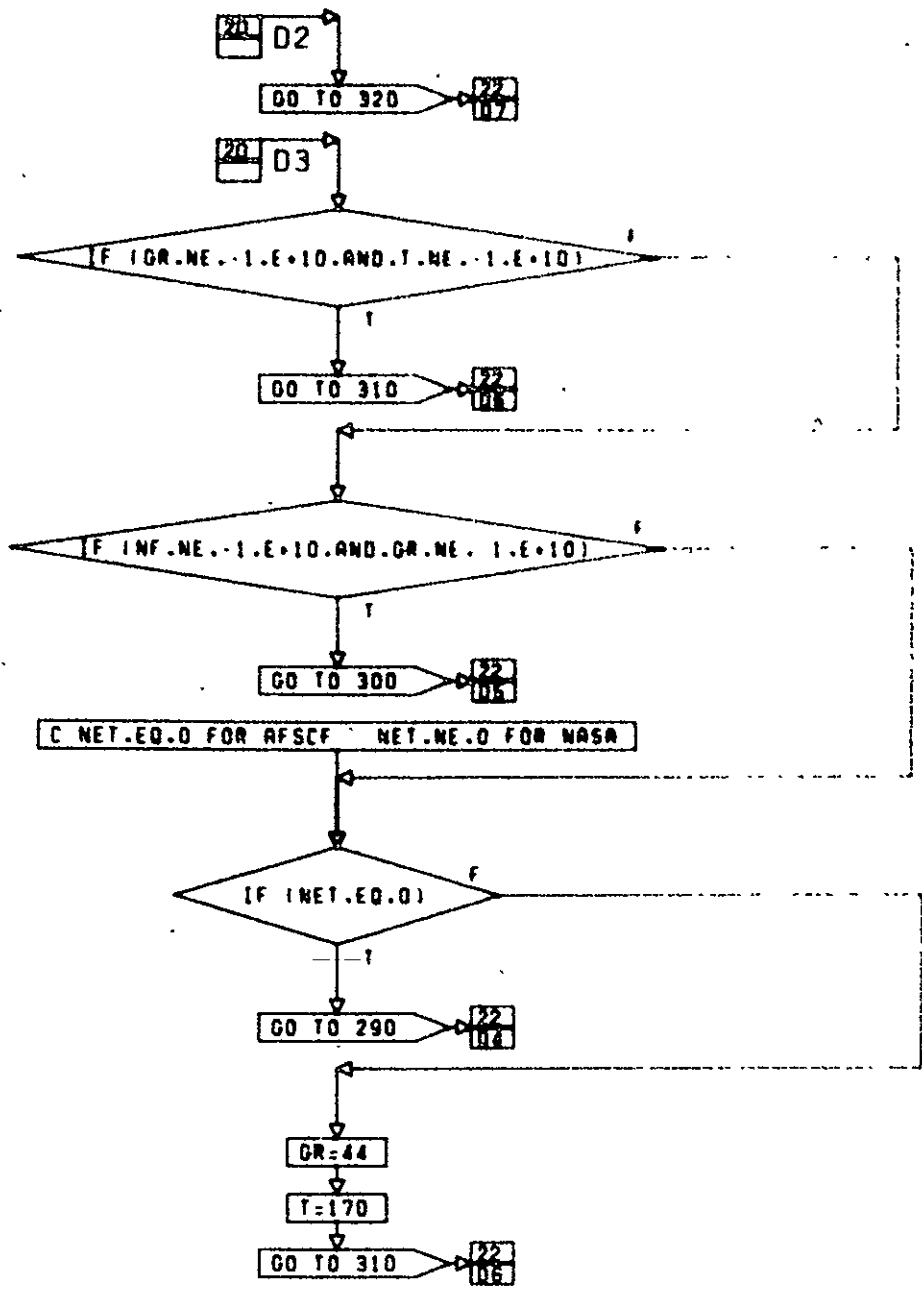
PG 19E S2

042



CONT. ON PG 21

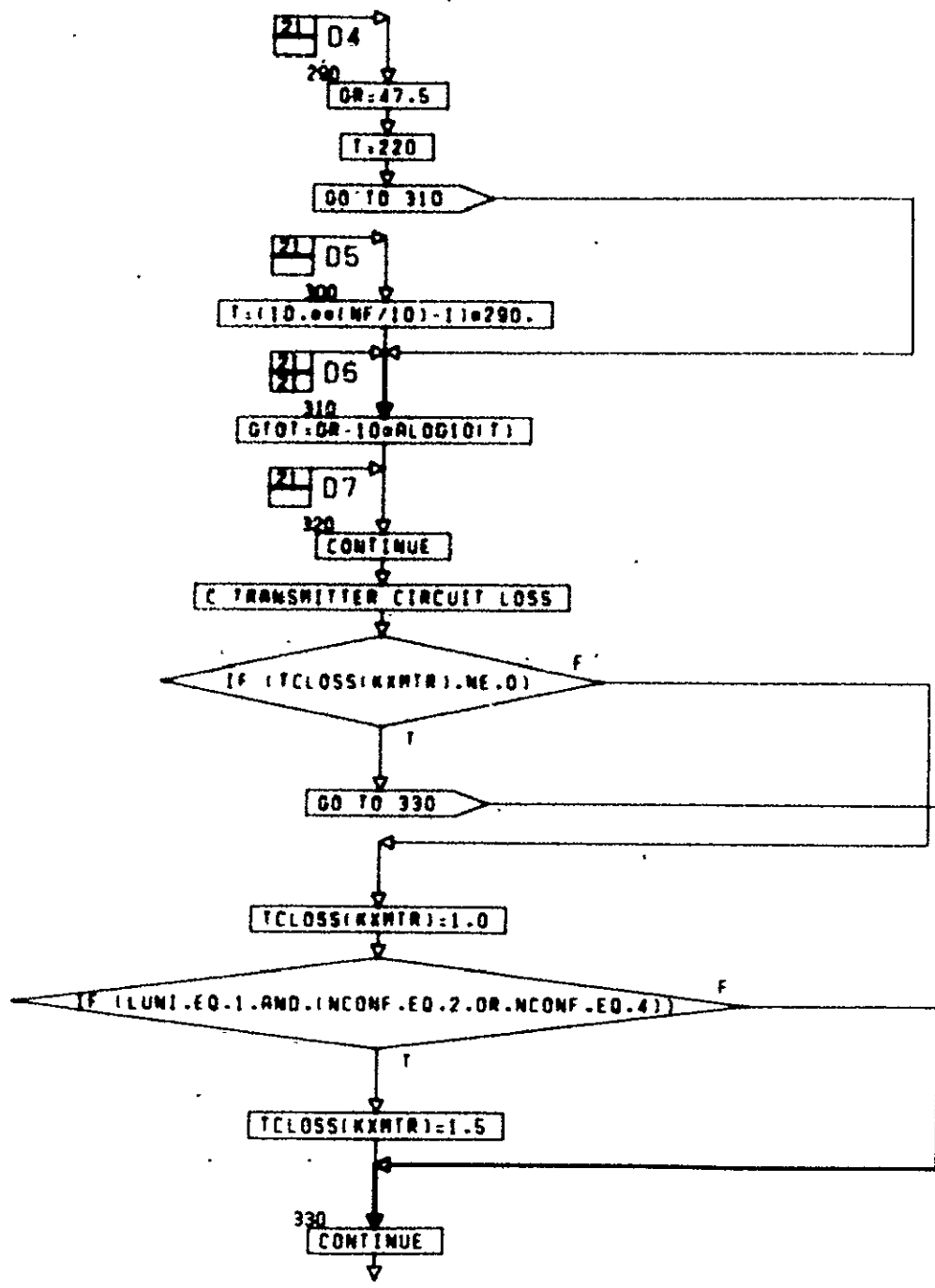
PG 200F 52



CONT. ON PG 22

PG 2 OF 52

863

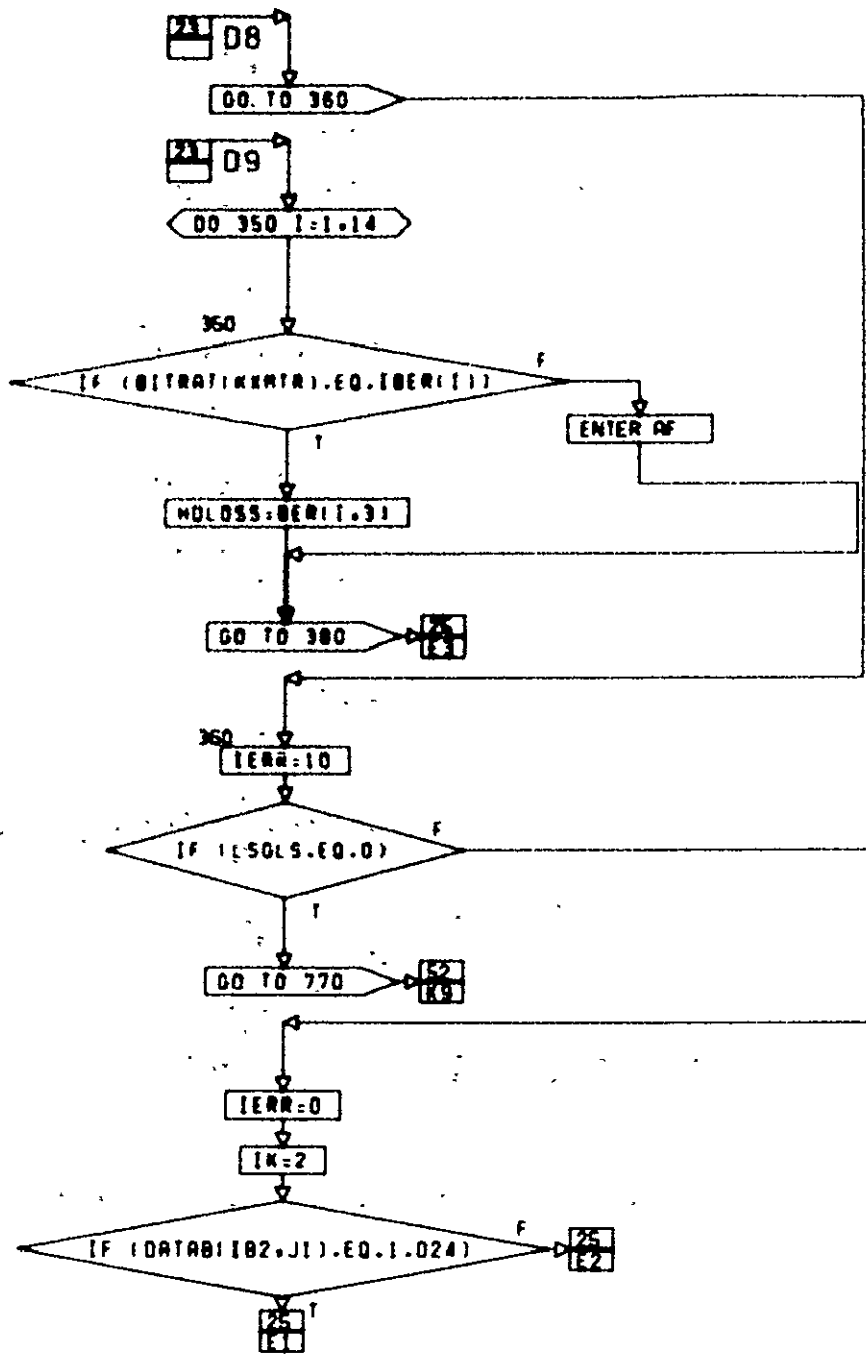


CONT. DN PG 23

PG 22F 52

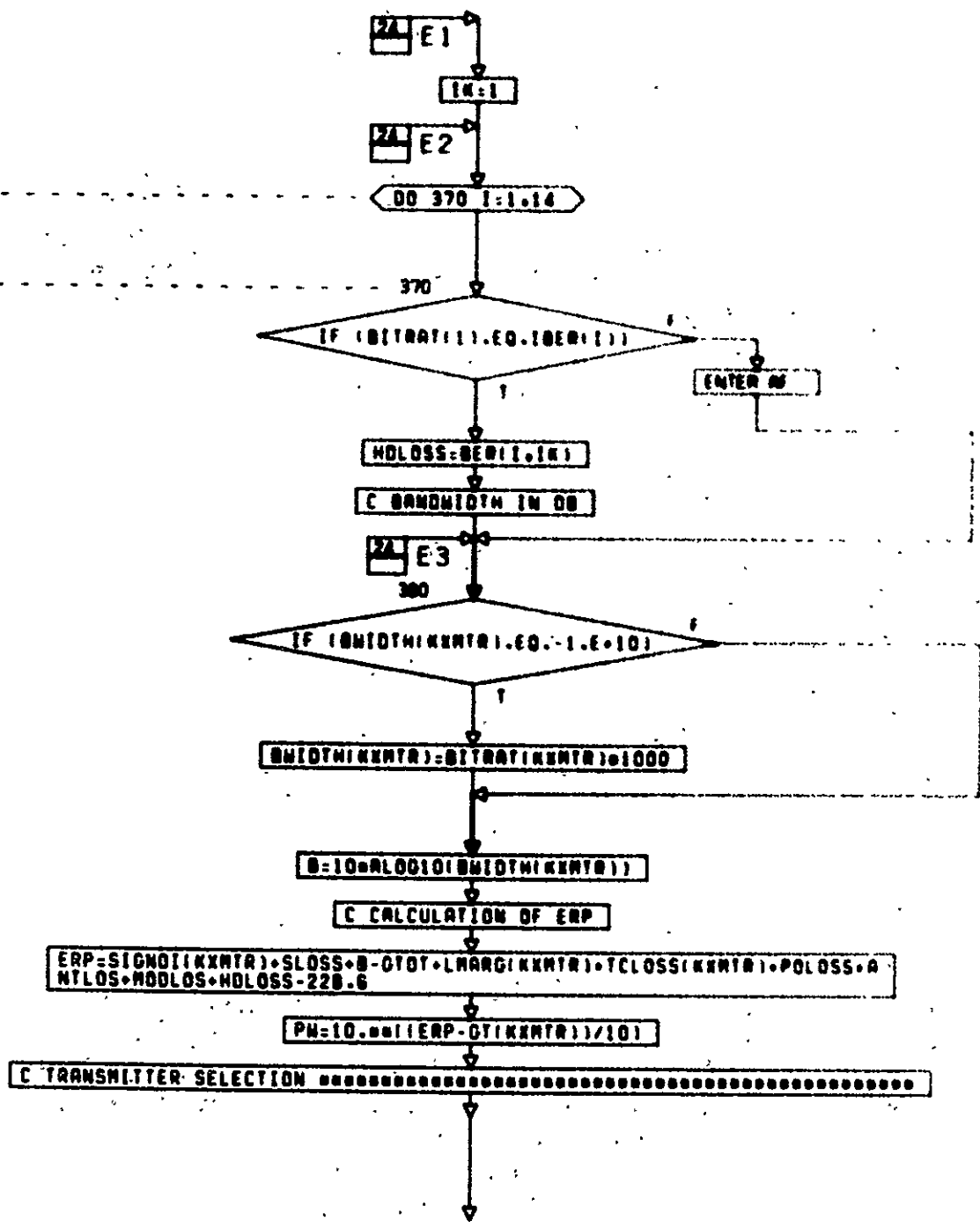




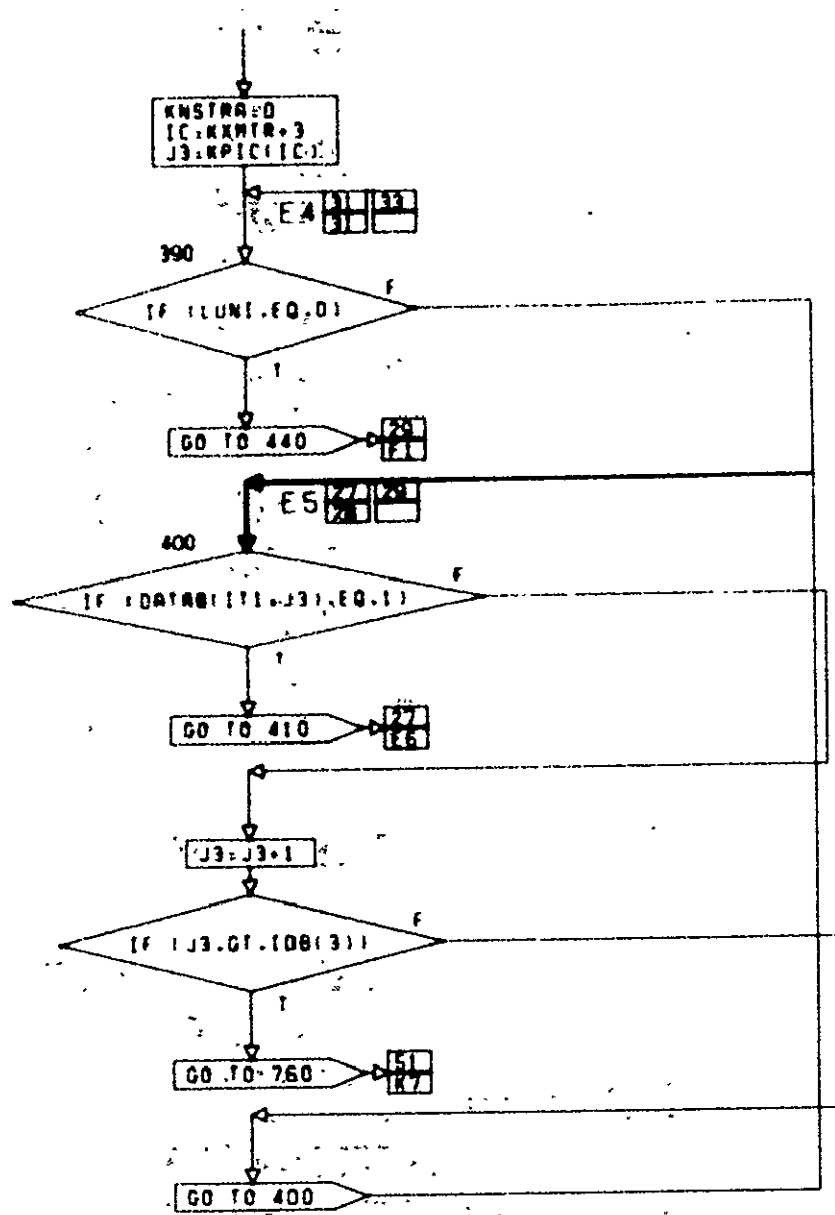


CONT. ON PG 25

PG 20F 52

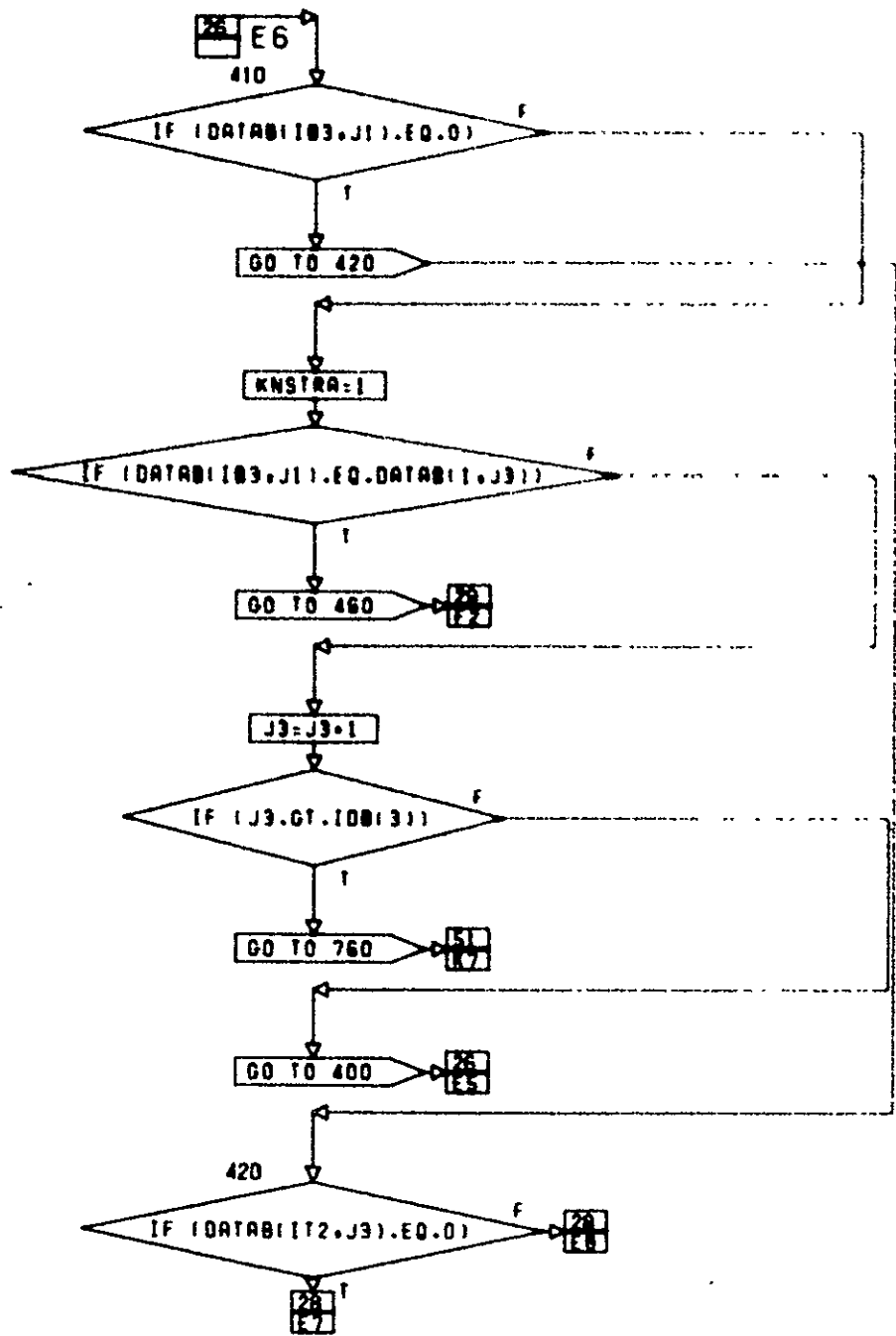


CONT. ON PG 26



CONT. ON PG 27

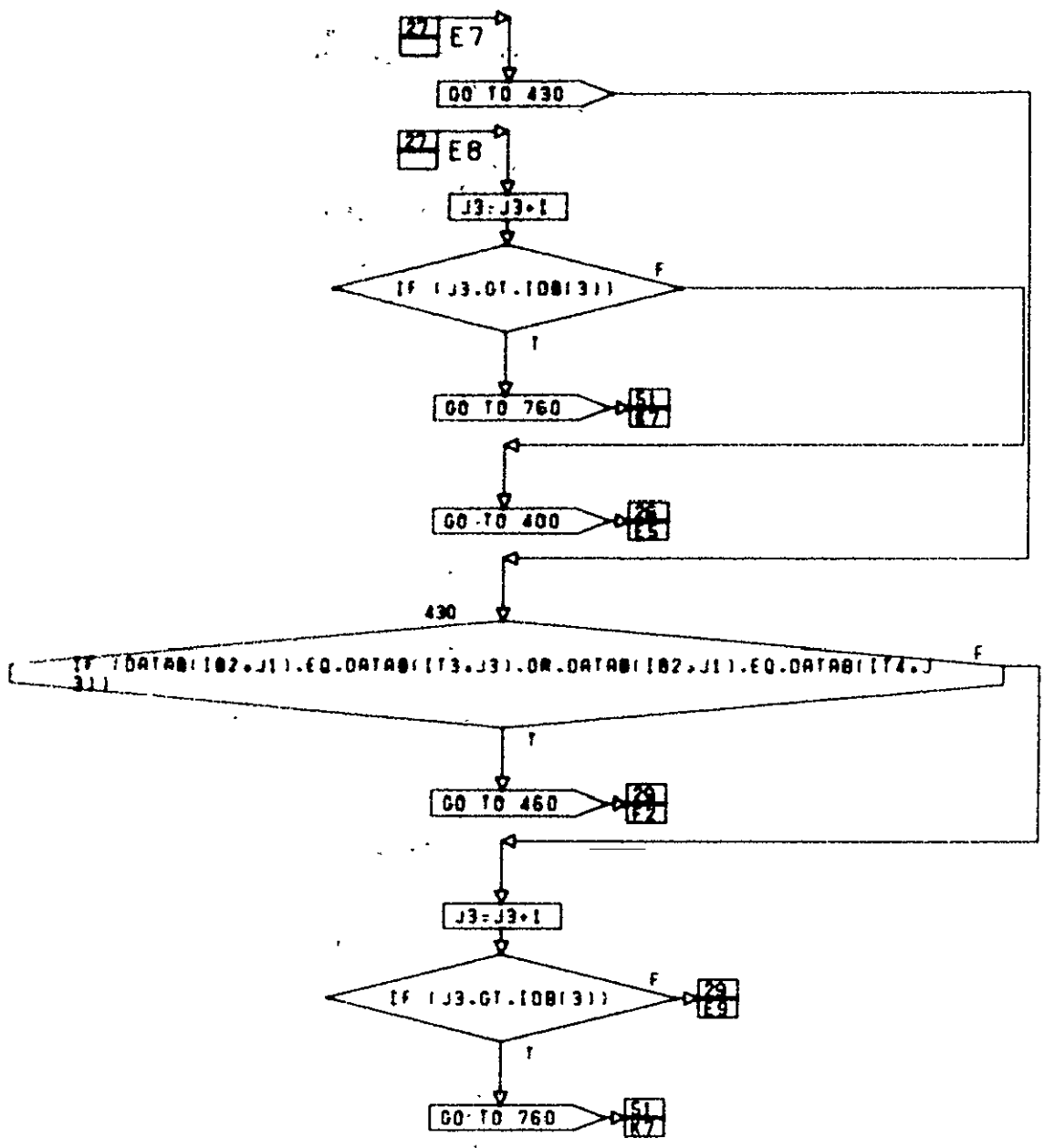
PG 20F 52



CONT. ON PG 28

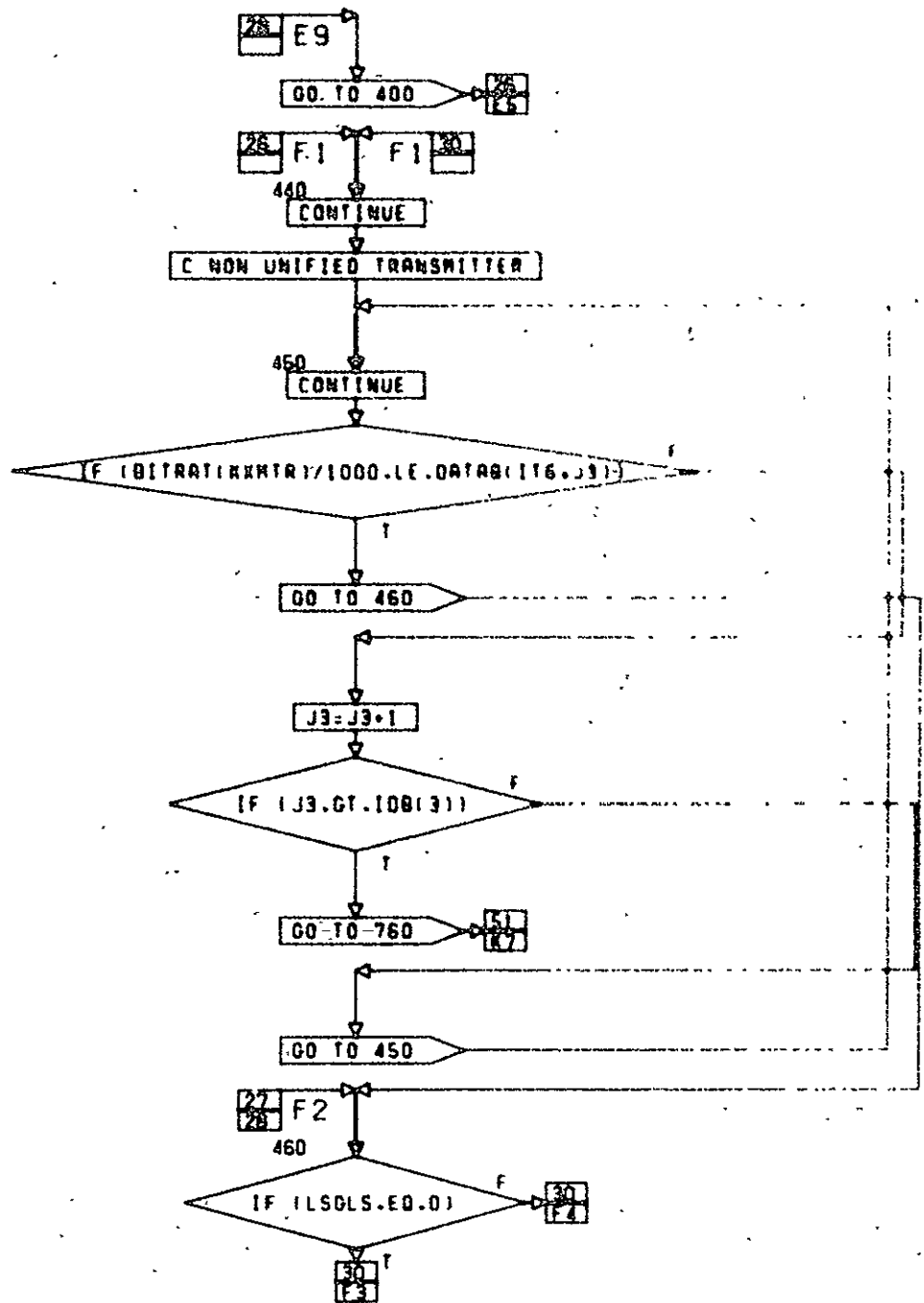
PG 2 OF 52

000



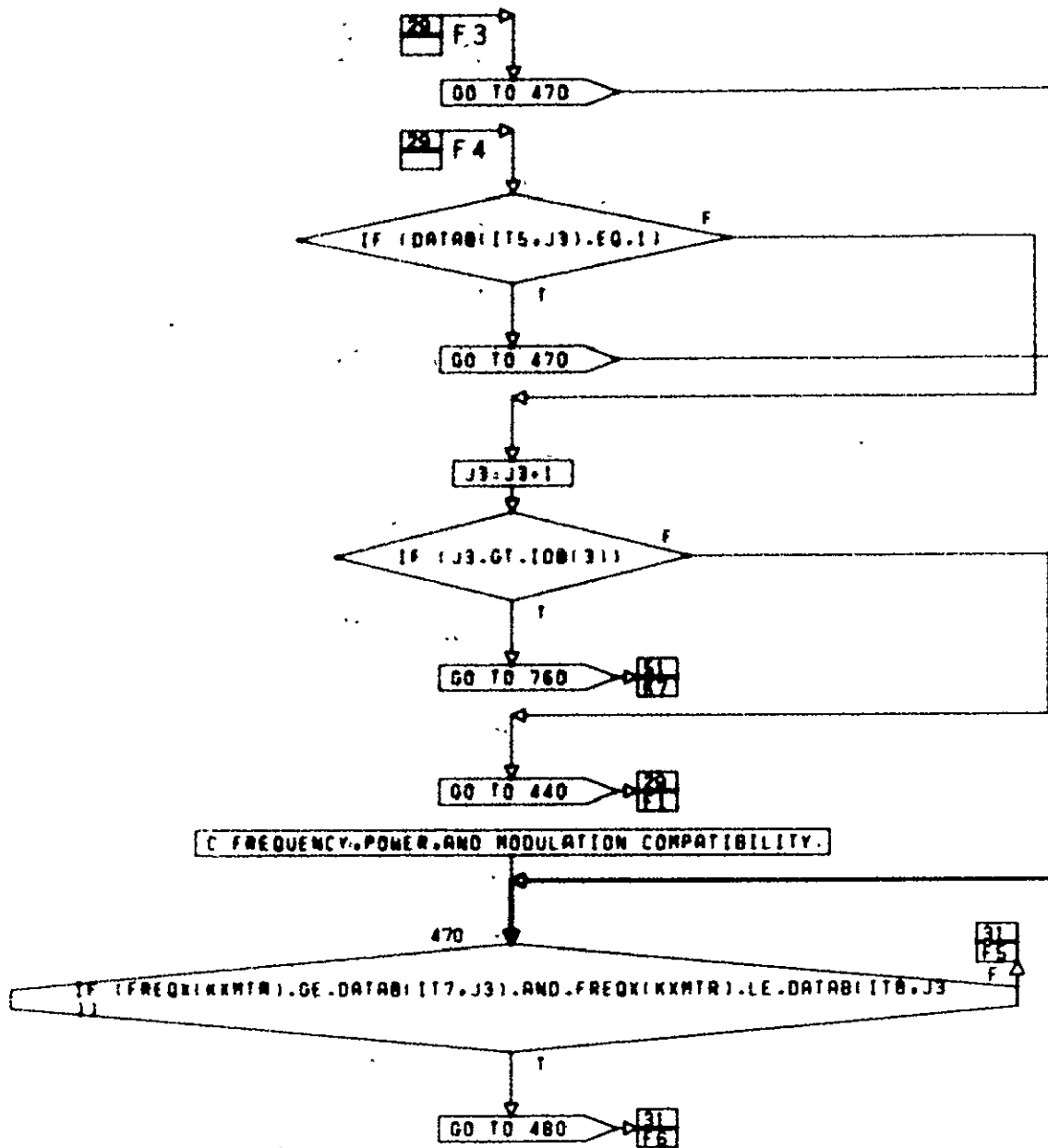
CONT. ON PG 29

PG 28DF 52



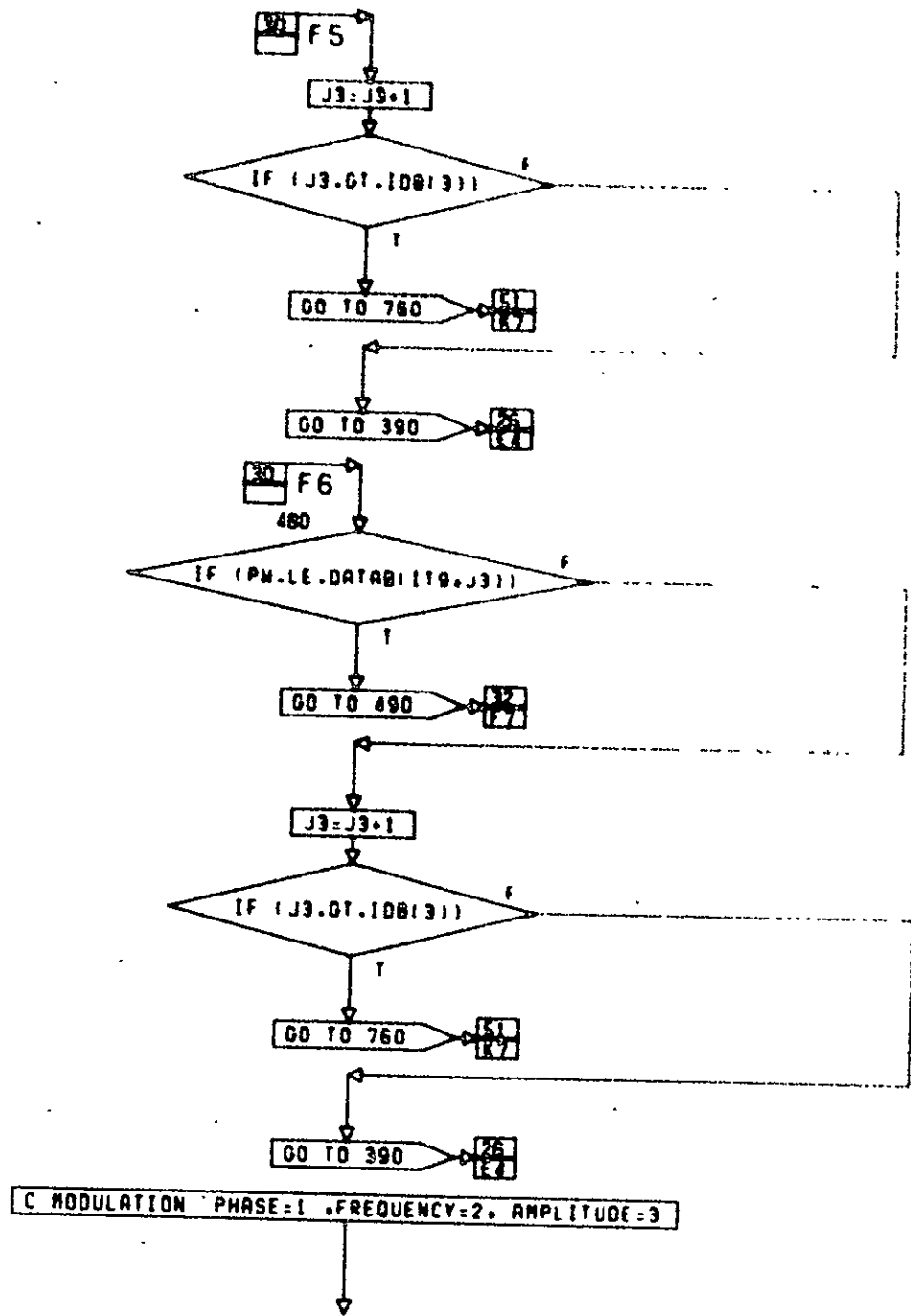
CONT. ON PG 30

PG 29F 52



CONT. ON PG , 31

PG 300F 52

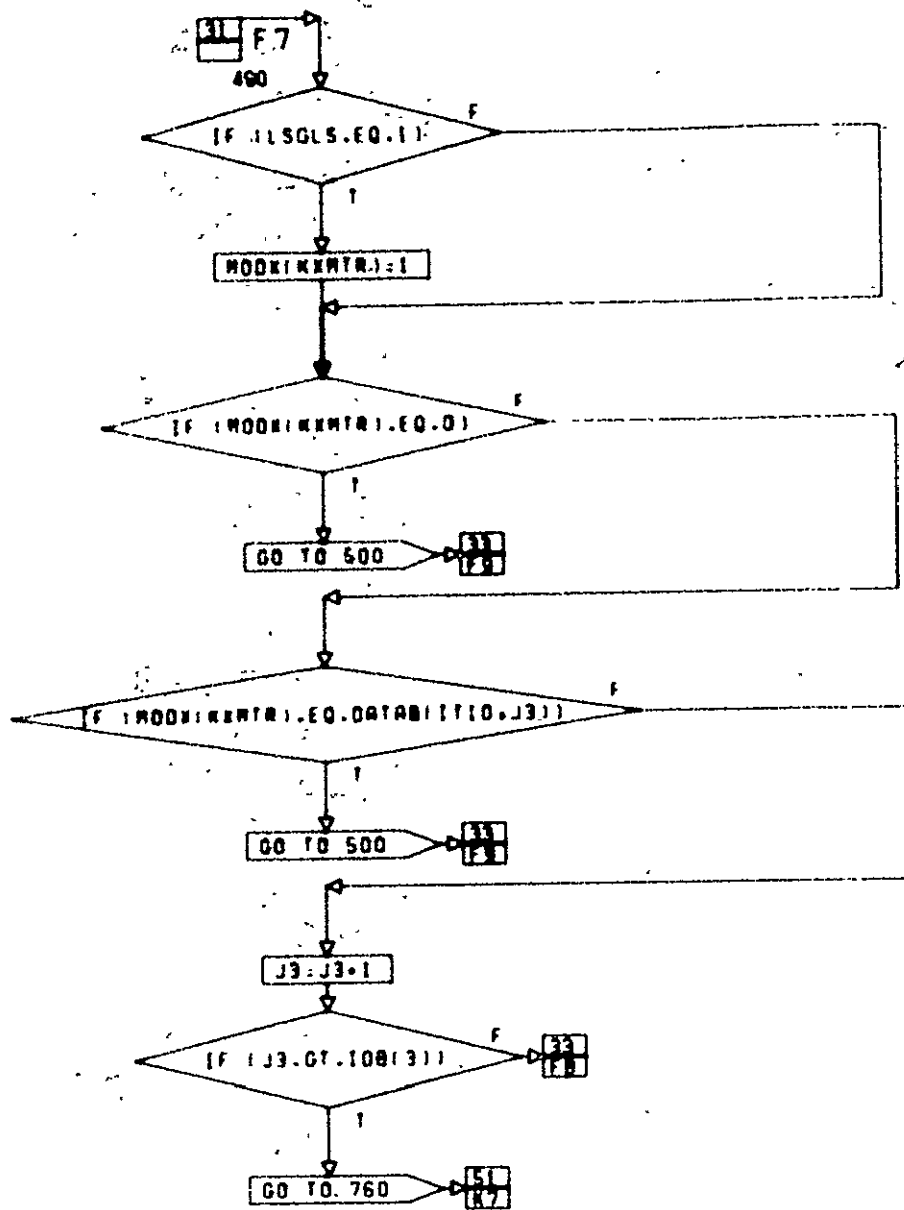


CONT. ON PG 32

PG 30F 52

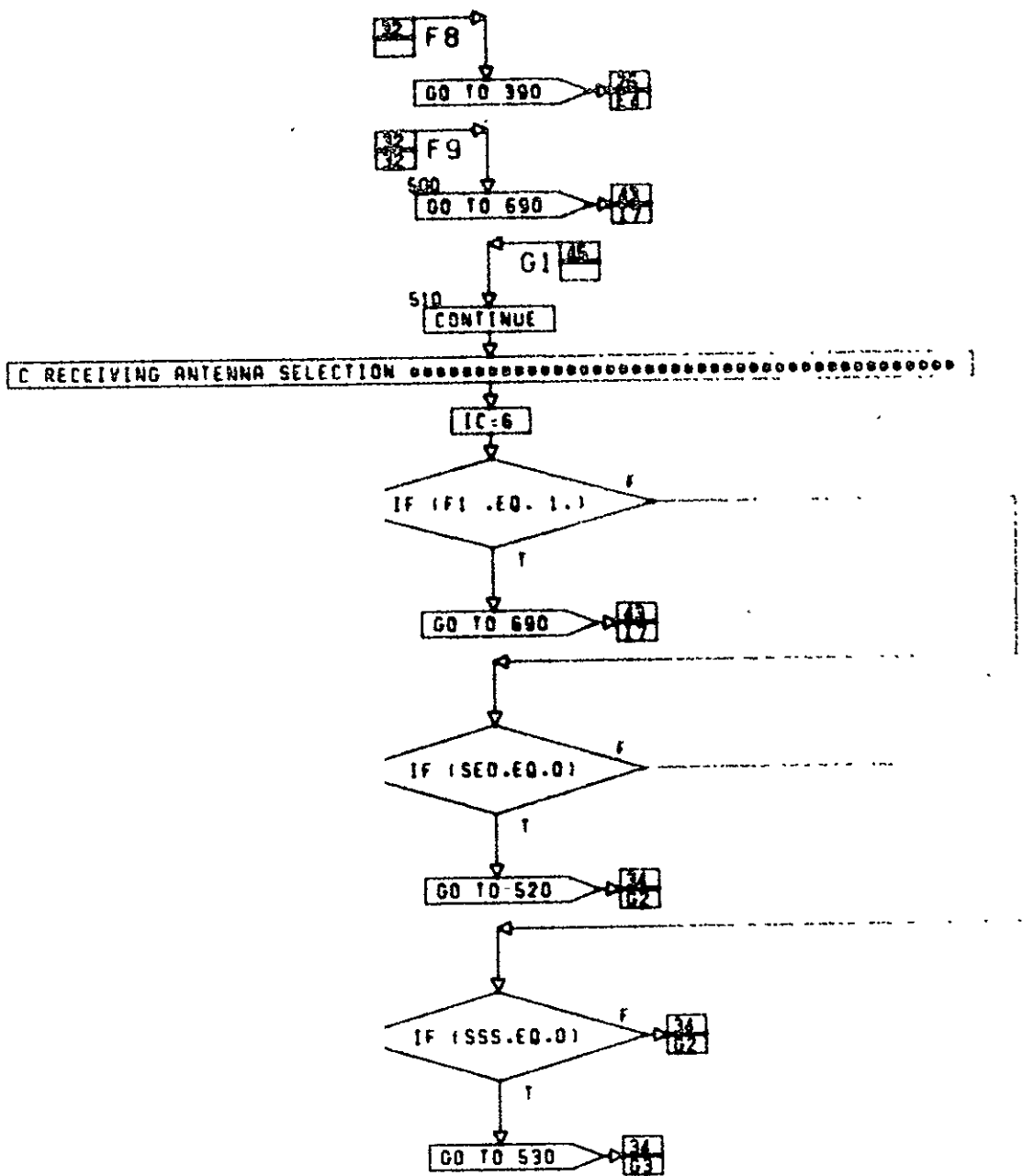
980





CONT. ON PG 33

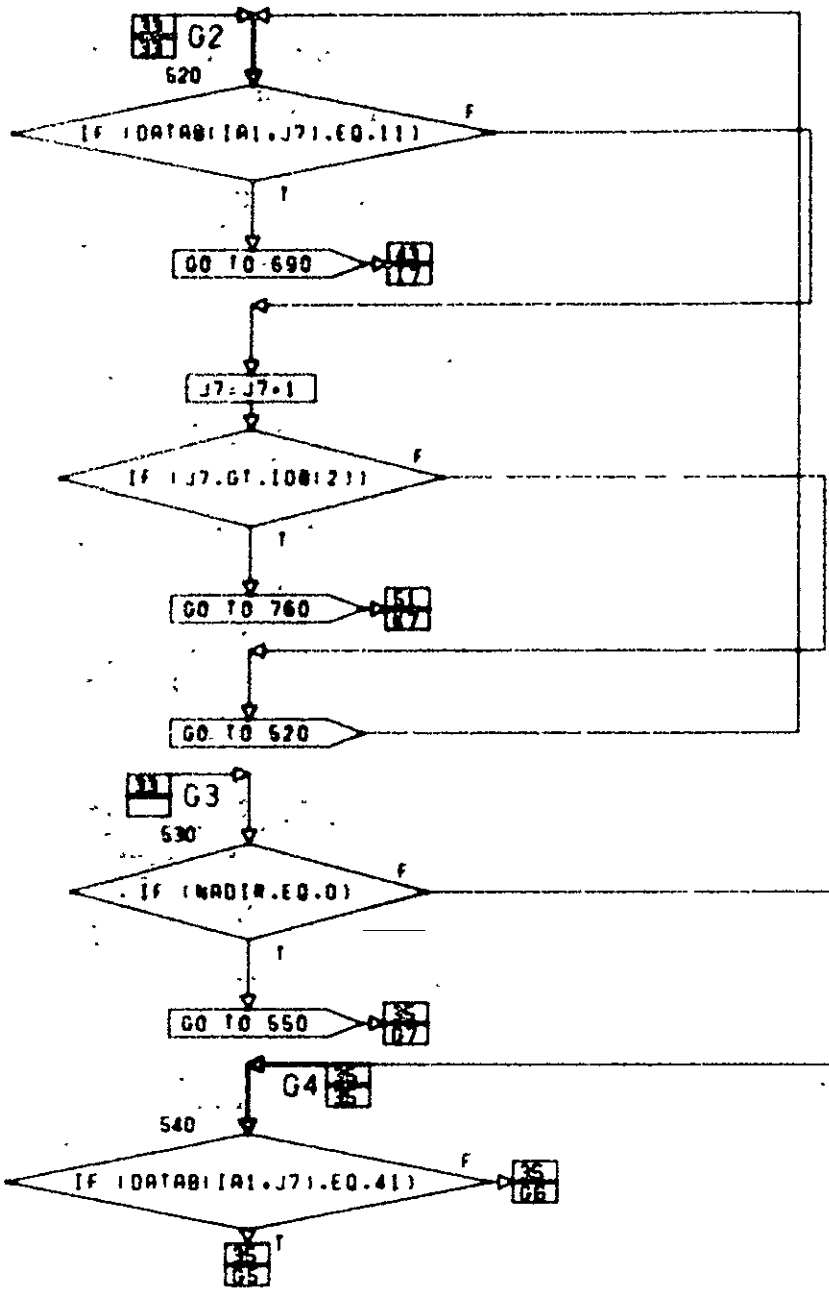
PG 32 OF 52

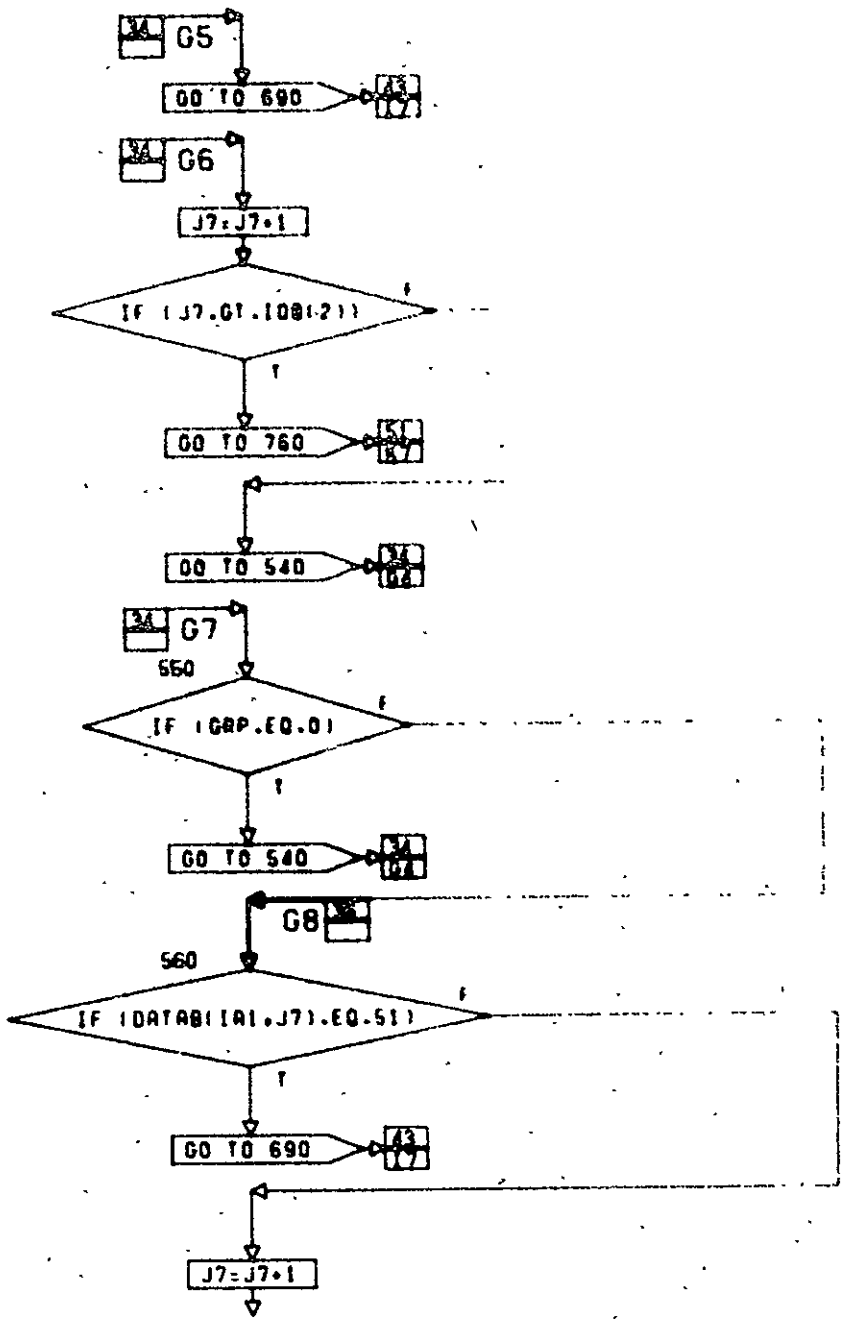


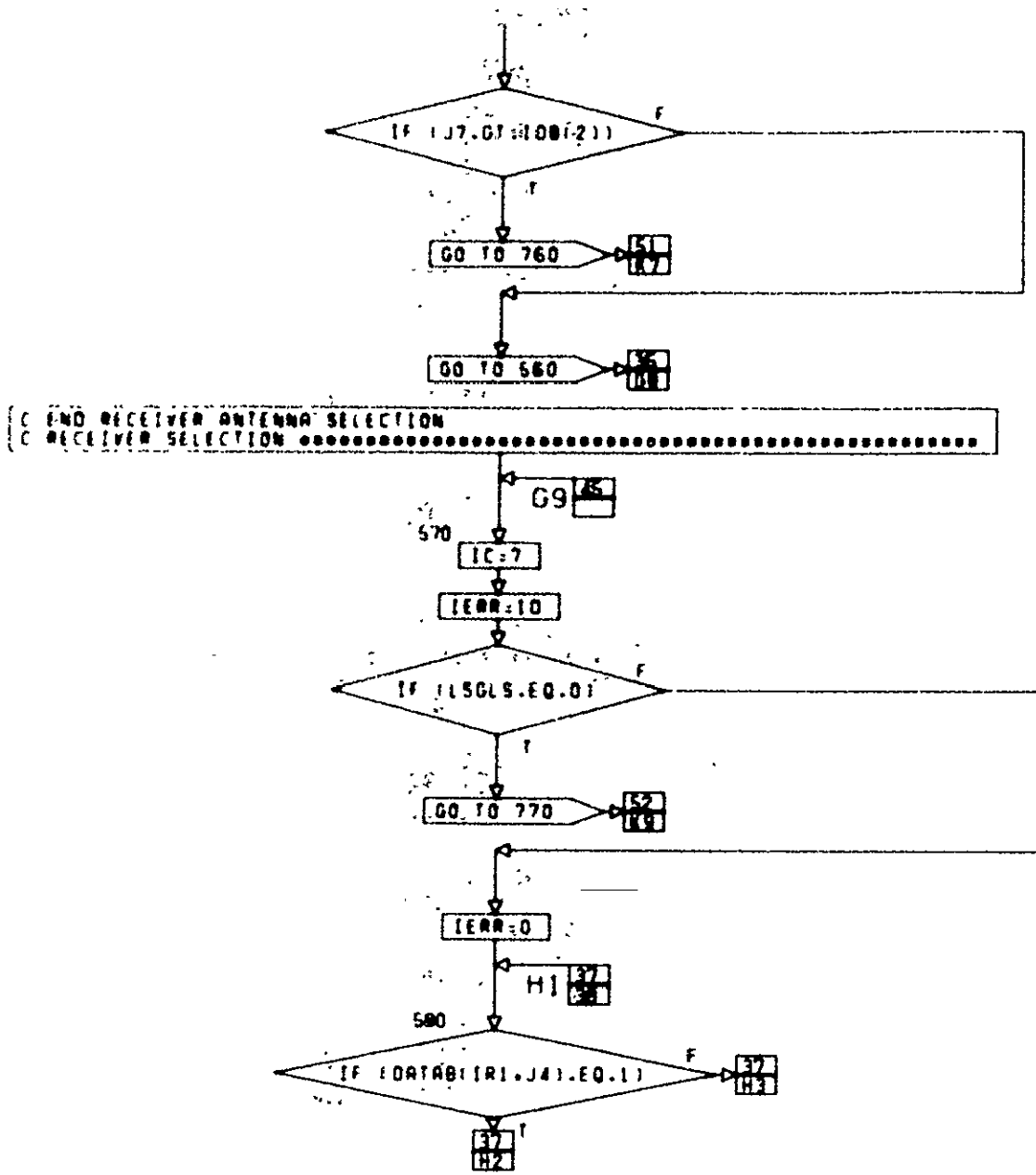
CONT. ON PG 34

PG 38F 52

889

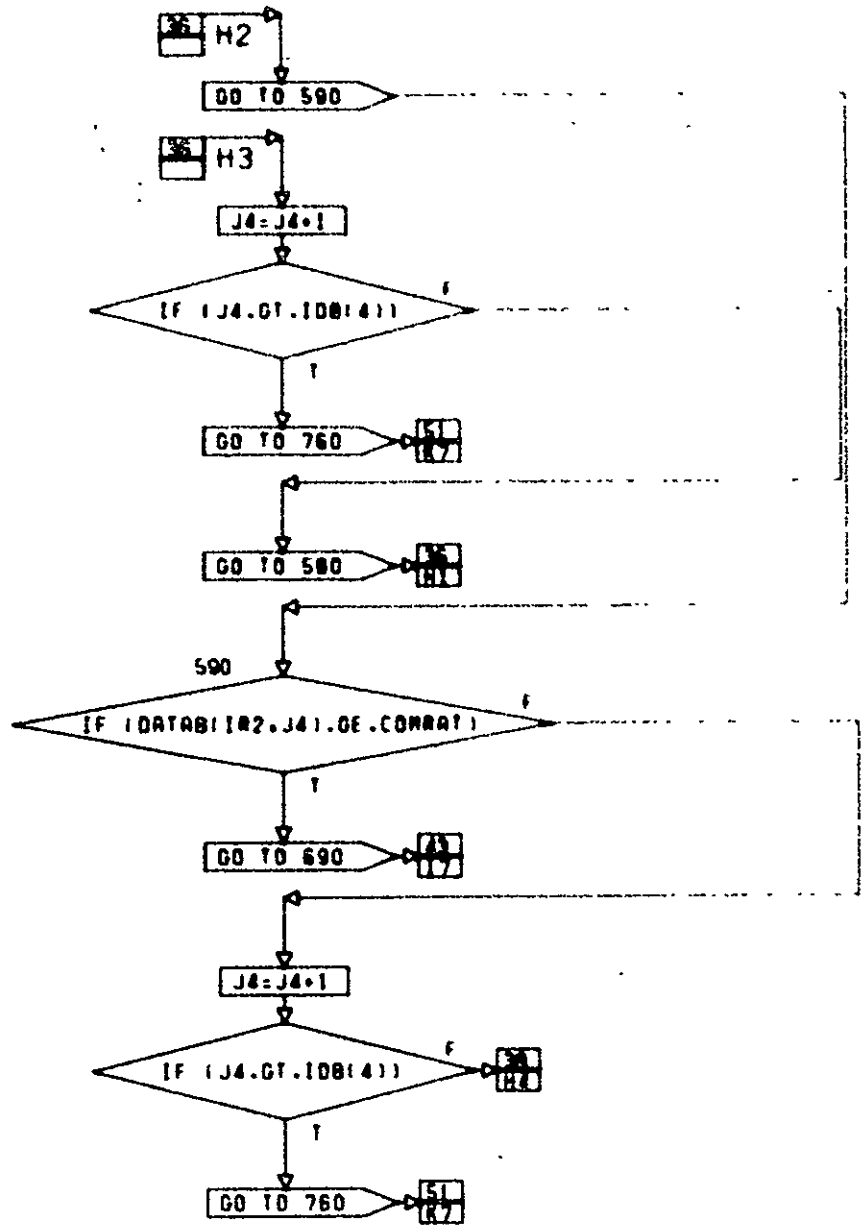






CONT. ON PG 37

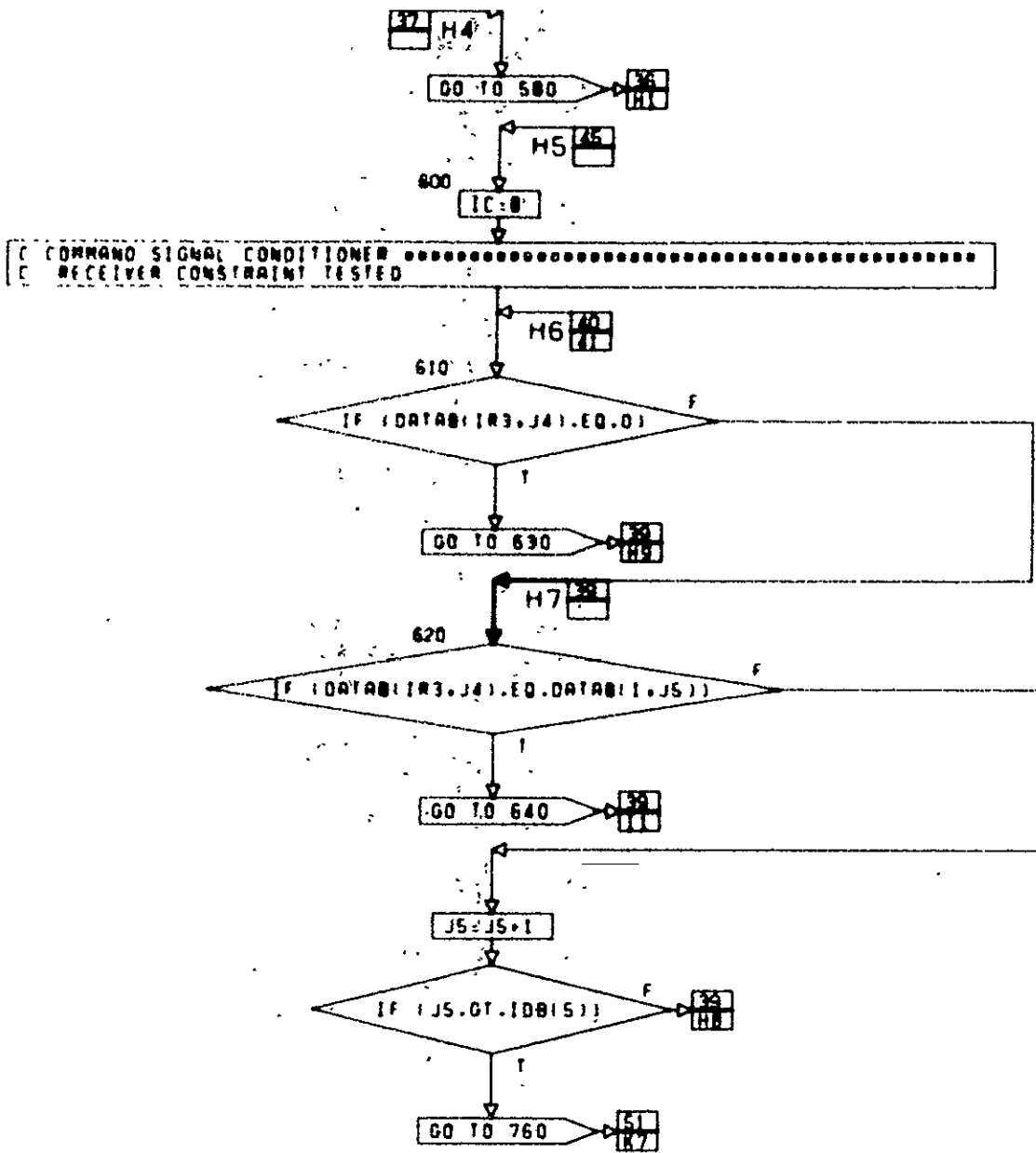
PG 380F 52



CONT. ON PG 38

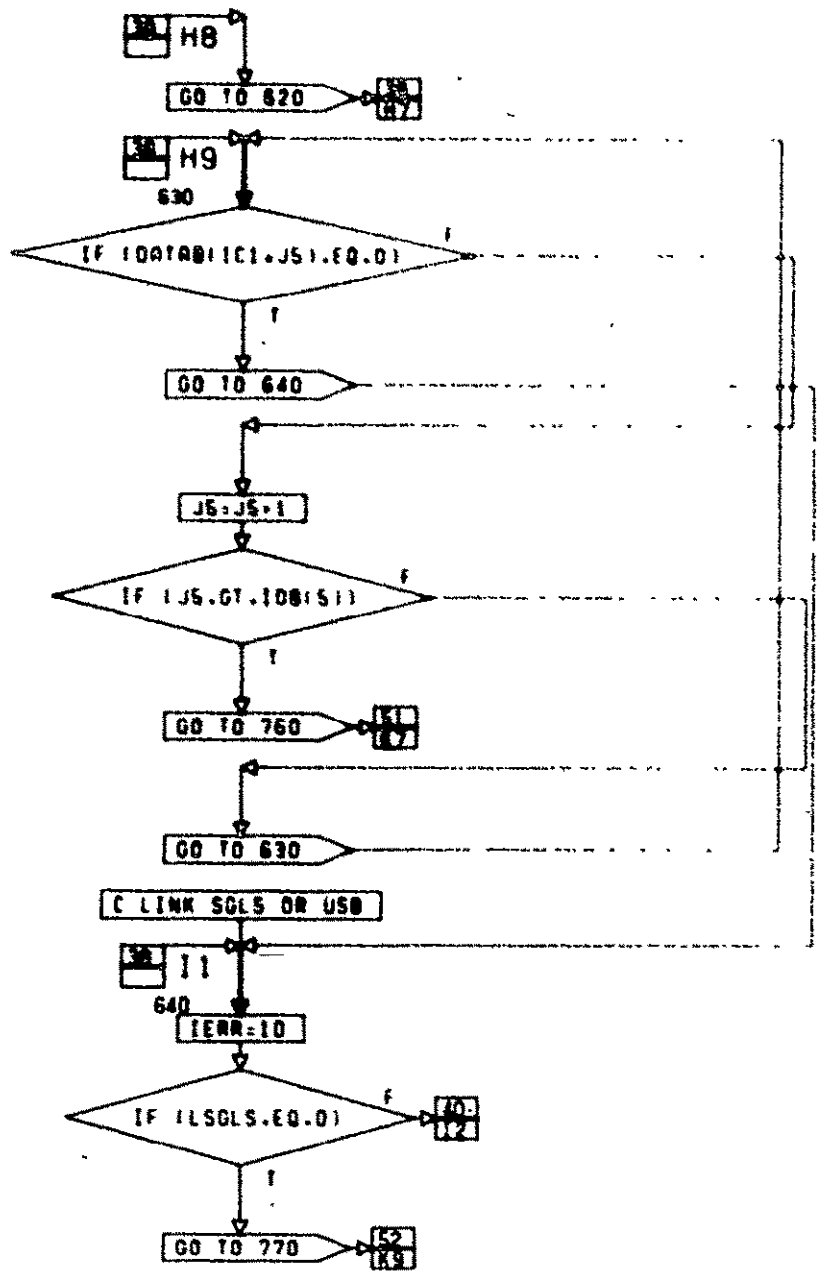
PG 37E 52

071



CONT. ON PG 39

PG 38DF 52

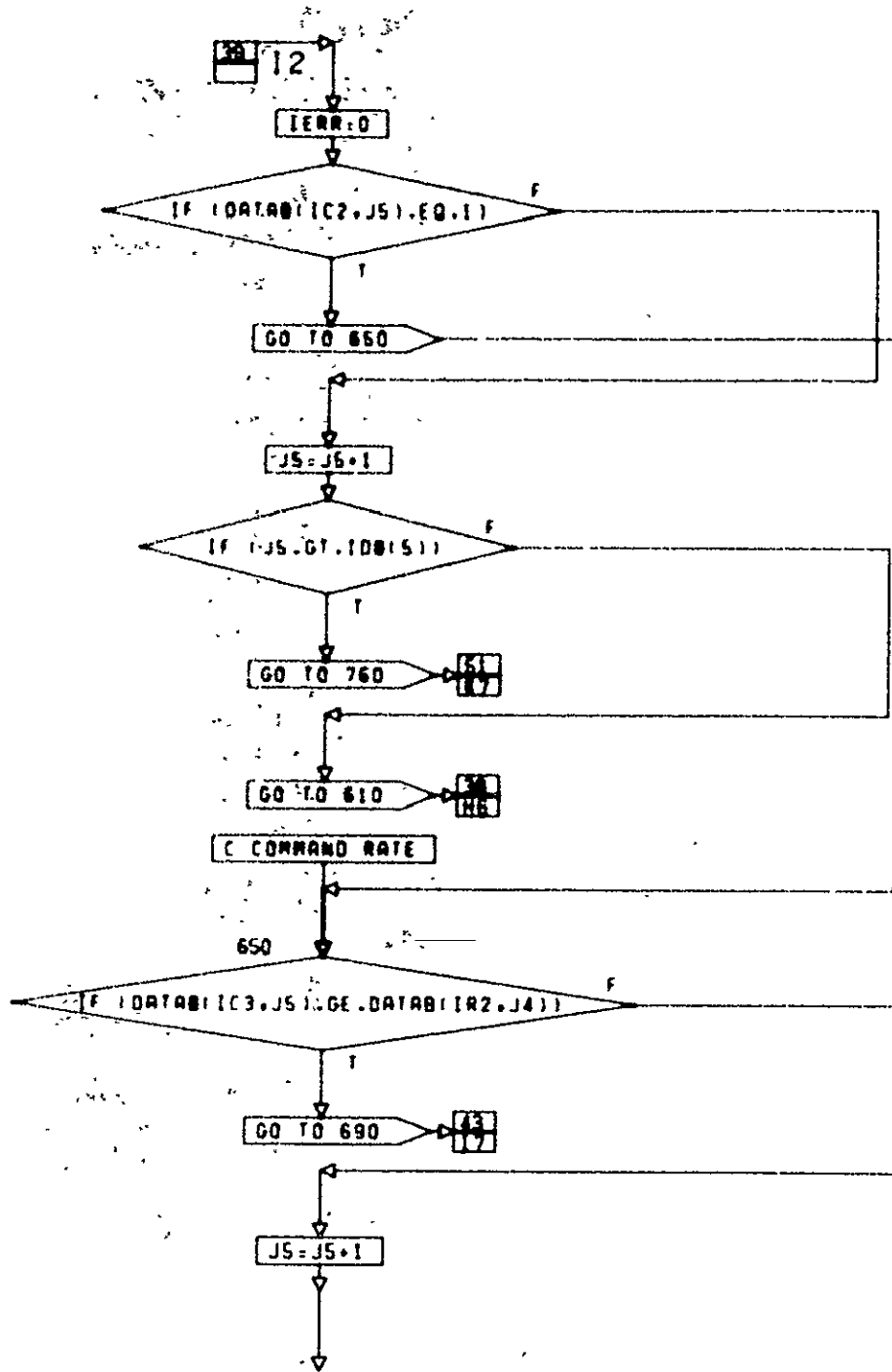


CONT. ON PG 40

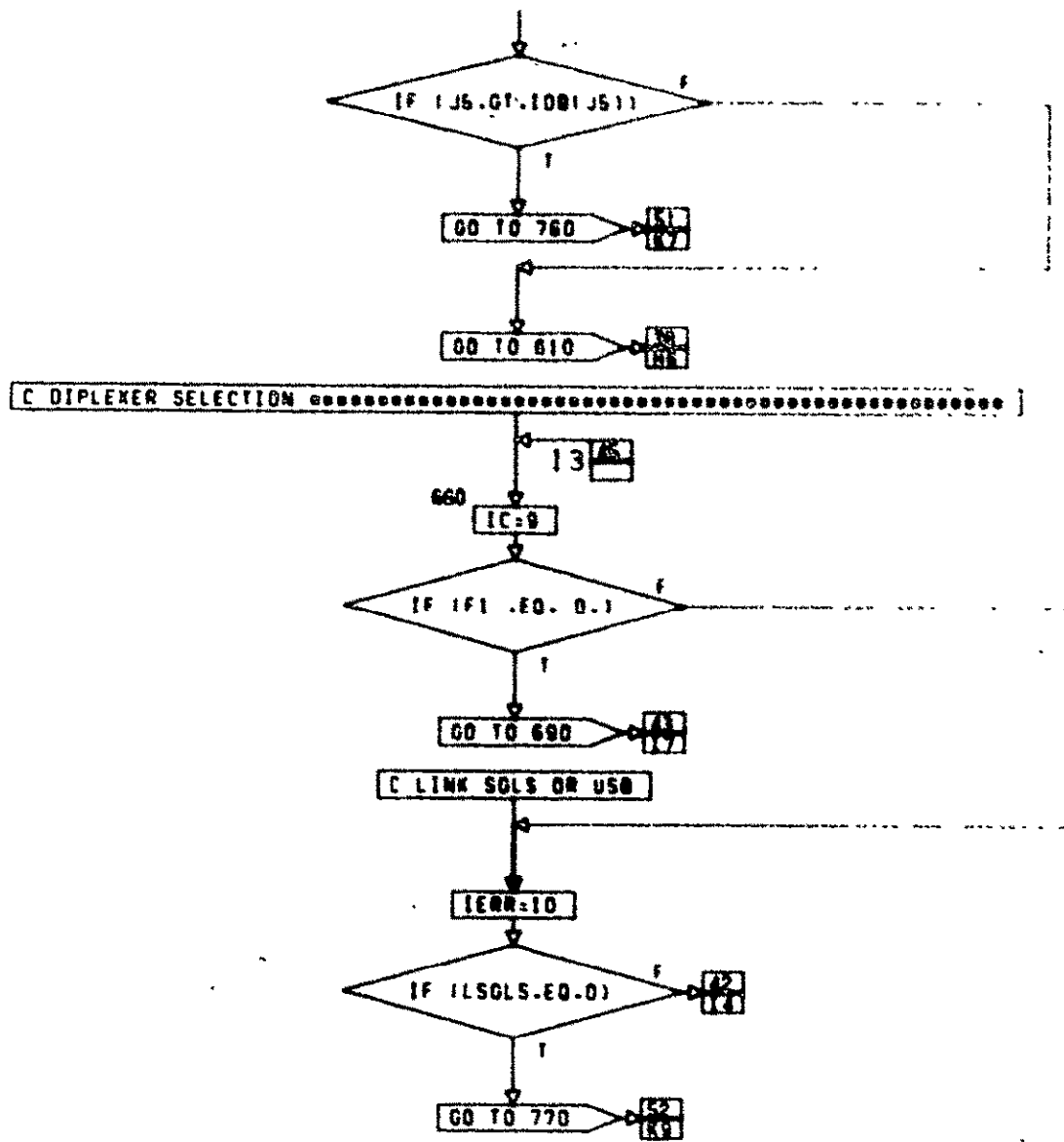
PG 39F 52

872





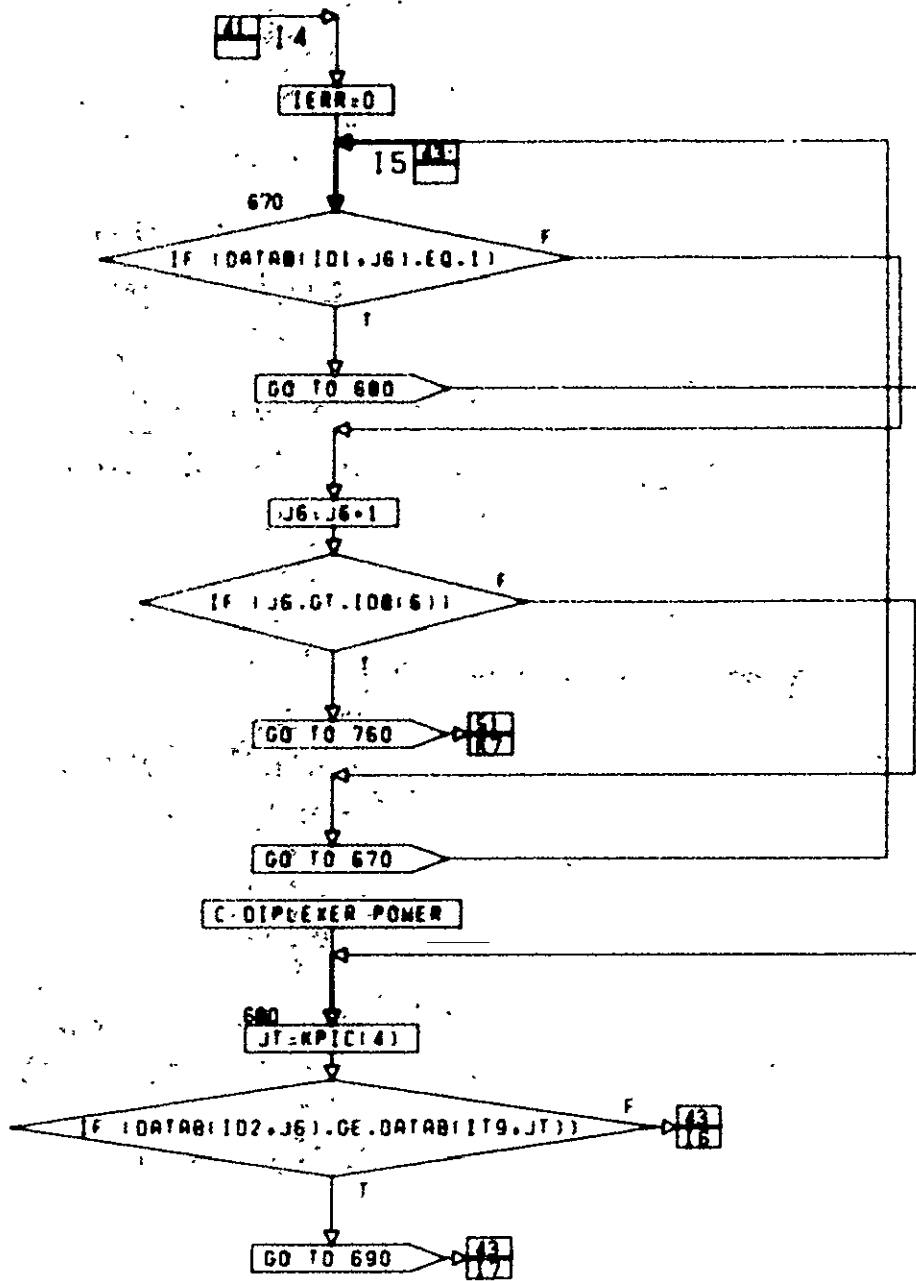
CONT. ON PG 41



CONT. ON PG 42

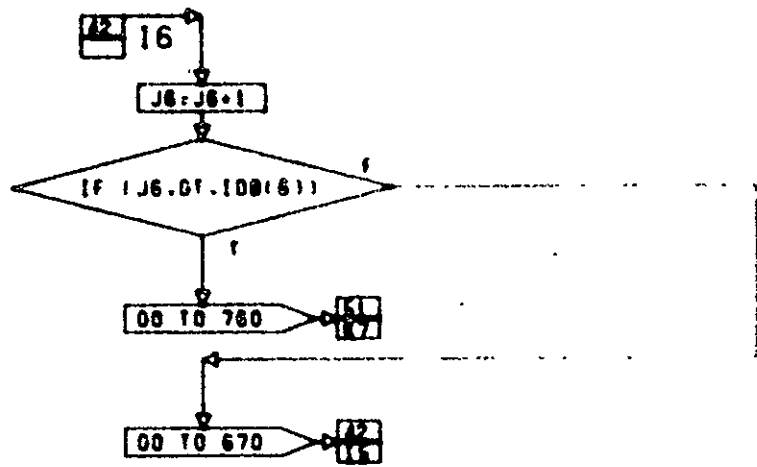
PG 40F 52

073

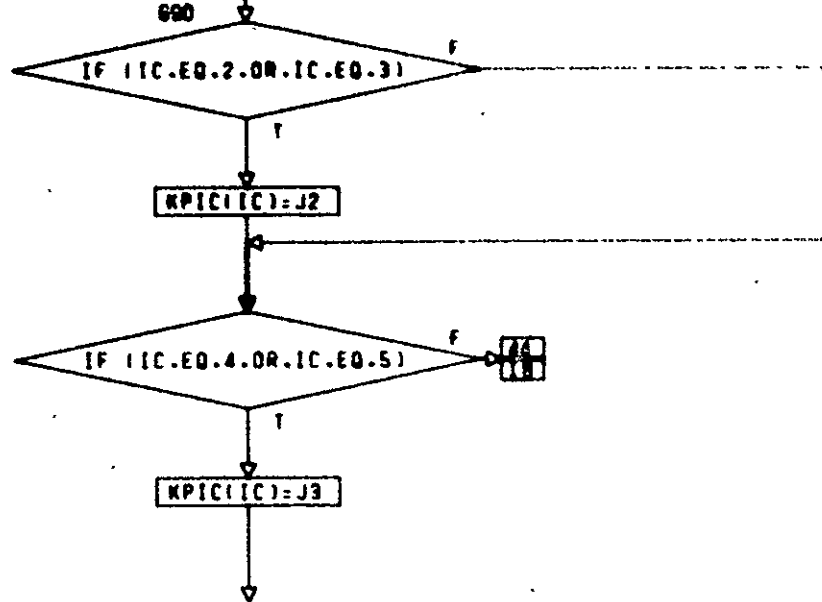


CONT. ON PG 43

PG 42F 52



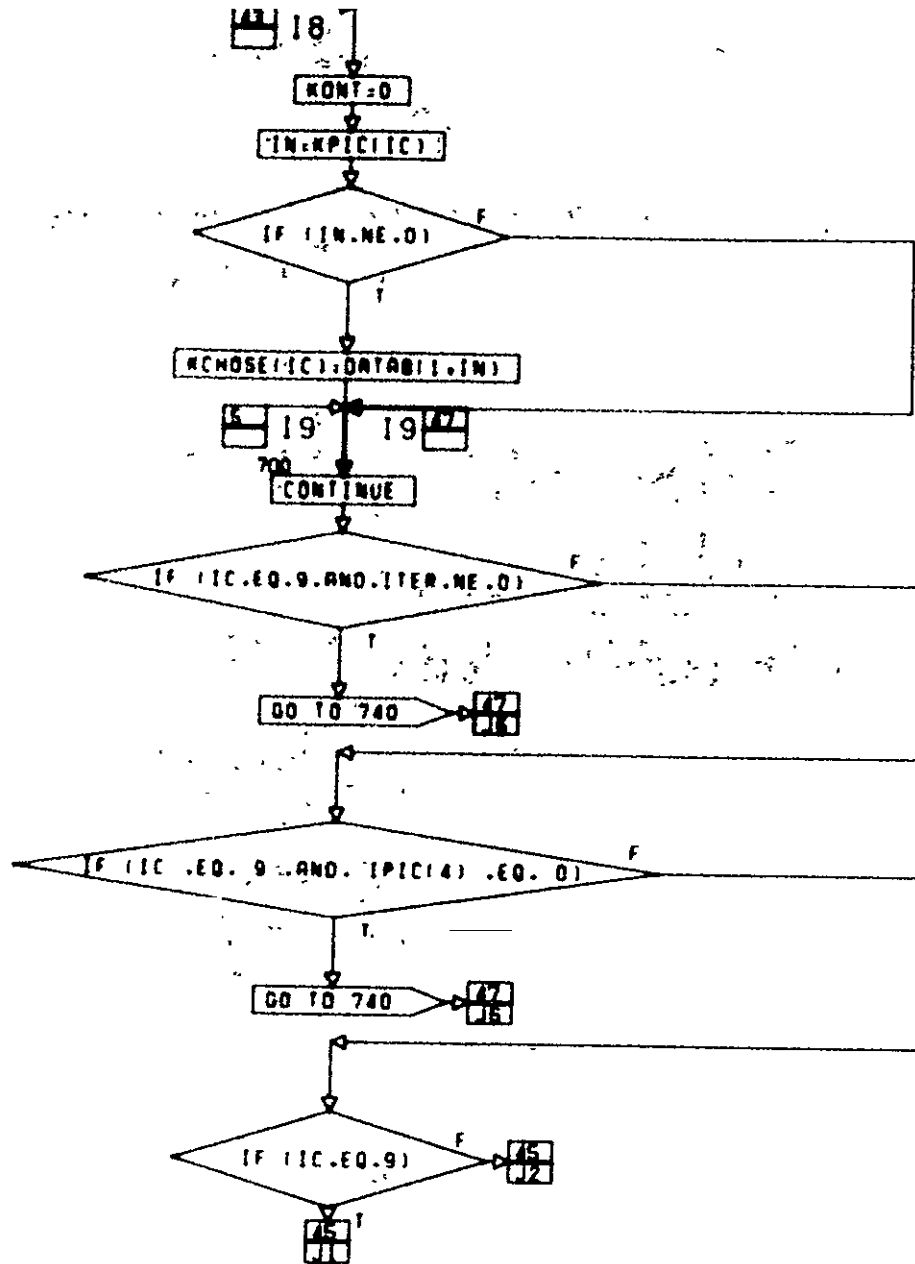
C PROGRAM CONTROL AND BOOK KEEPING .....  
 C J1-BASEBAND ASSEMBLY UNIT  
 C J2-TRANSMITTER ANTENNAS  
 C J3-TRANSMITTER  
 C J4-RECEIVER  
 C J5-SIGNAL CONDITIONER  
 C J6-DIPLEXER  
 C J7-RECEIVER ANTENNA

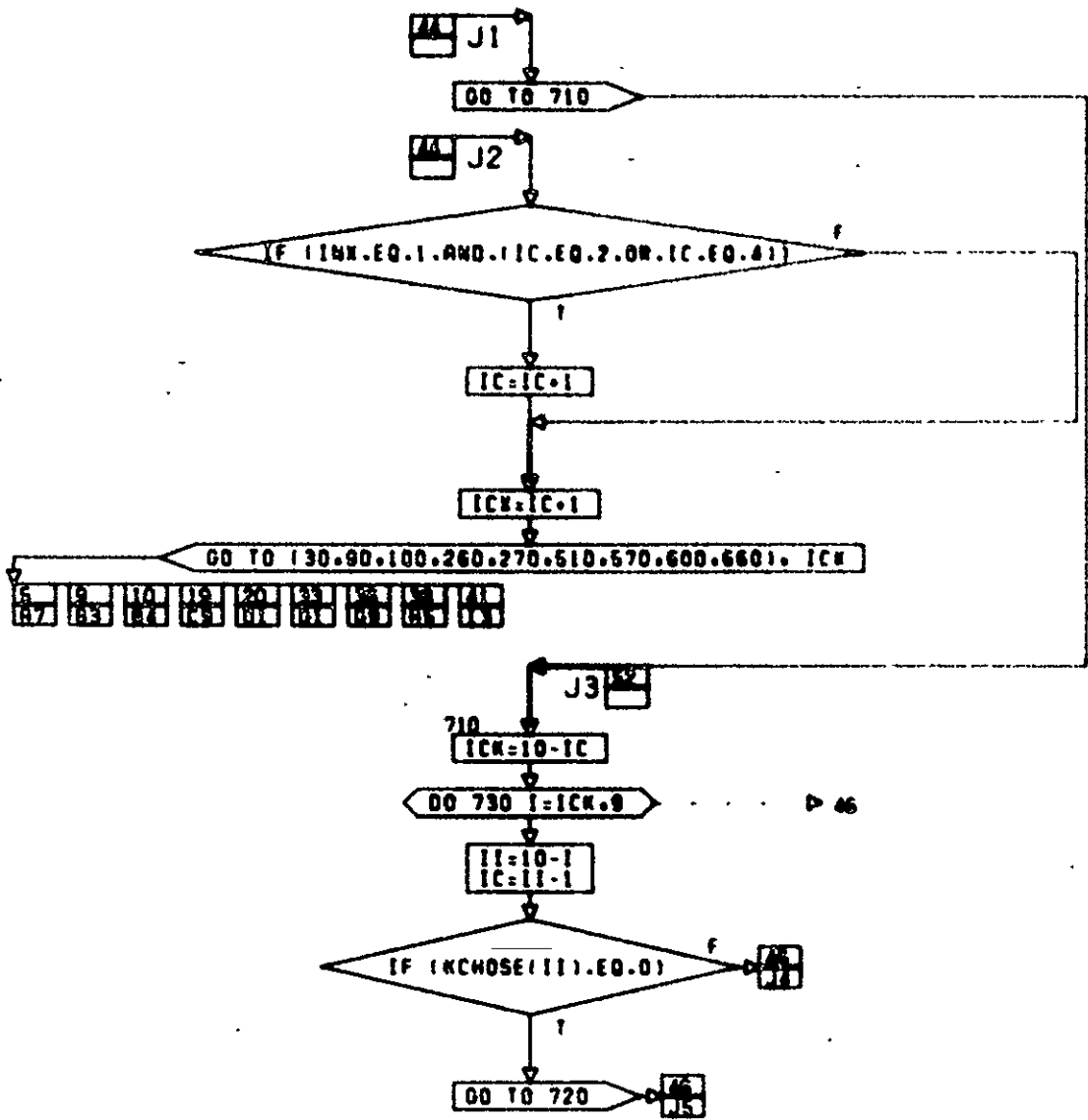


CONT. ON PG 44

PG 43E 52

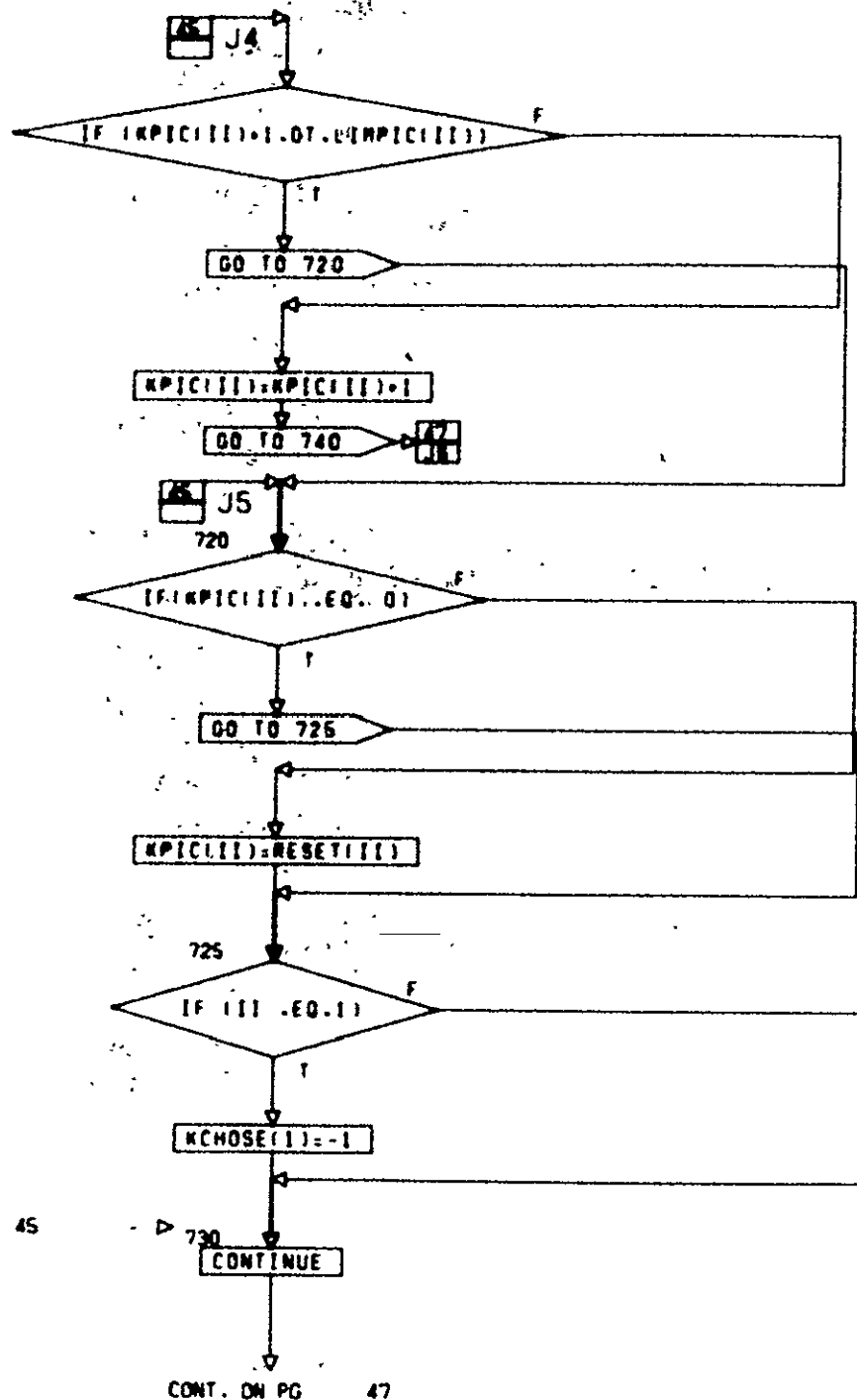
874





CONT. ON PG 46

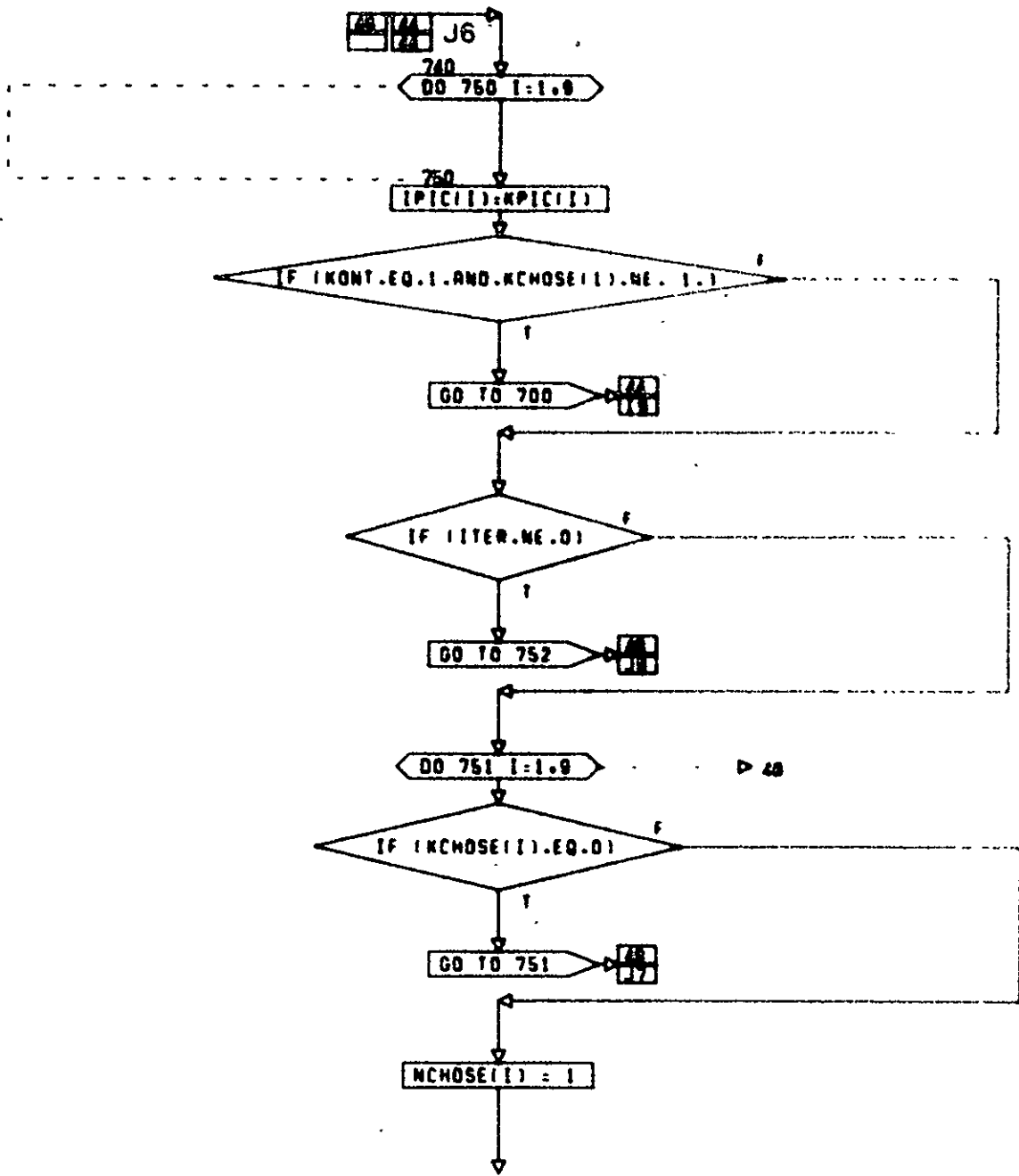
PG 45F S2



45

CONT. ON PG 47

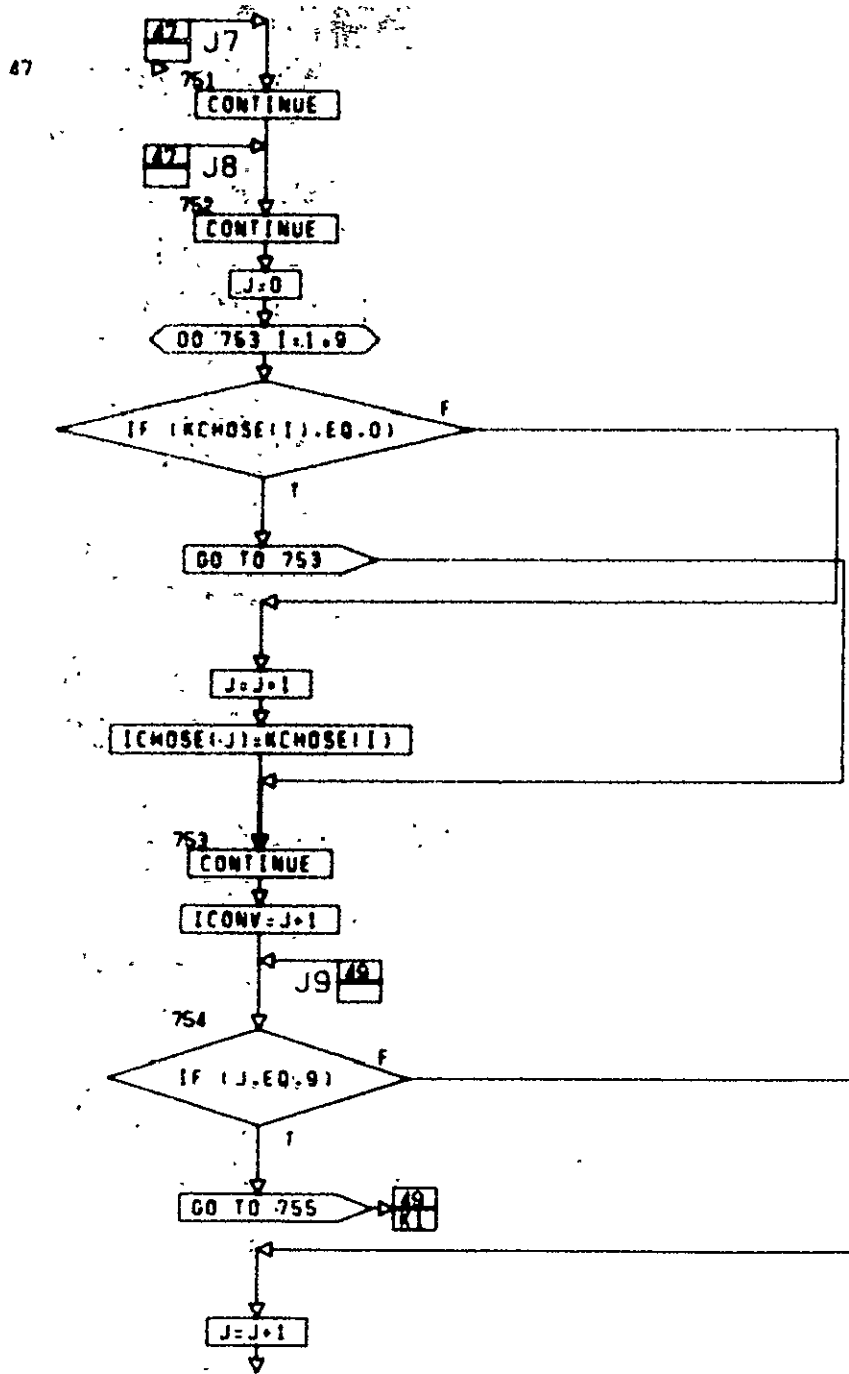
PG 46F 52



CONT. ON PG 48

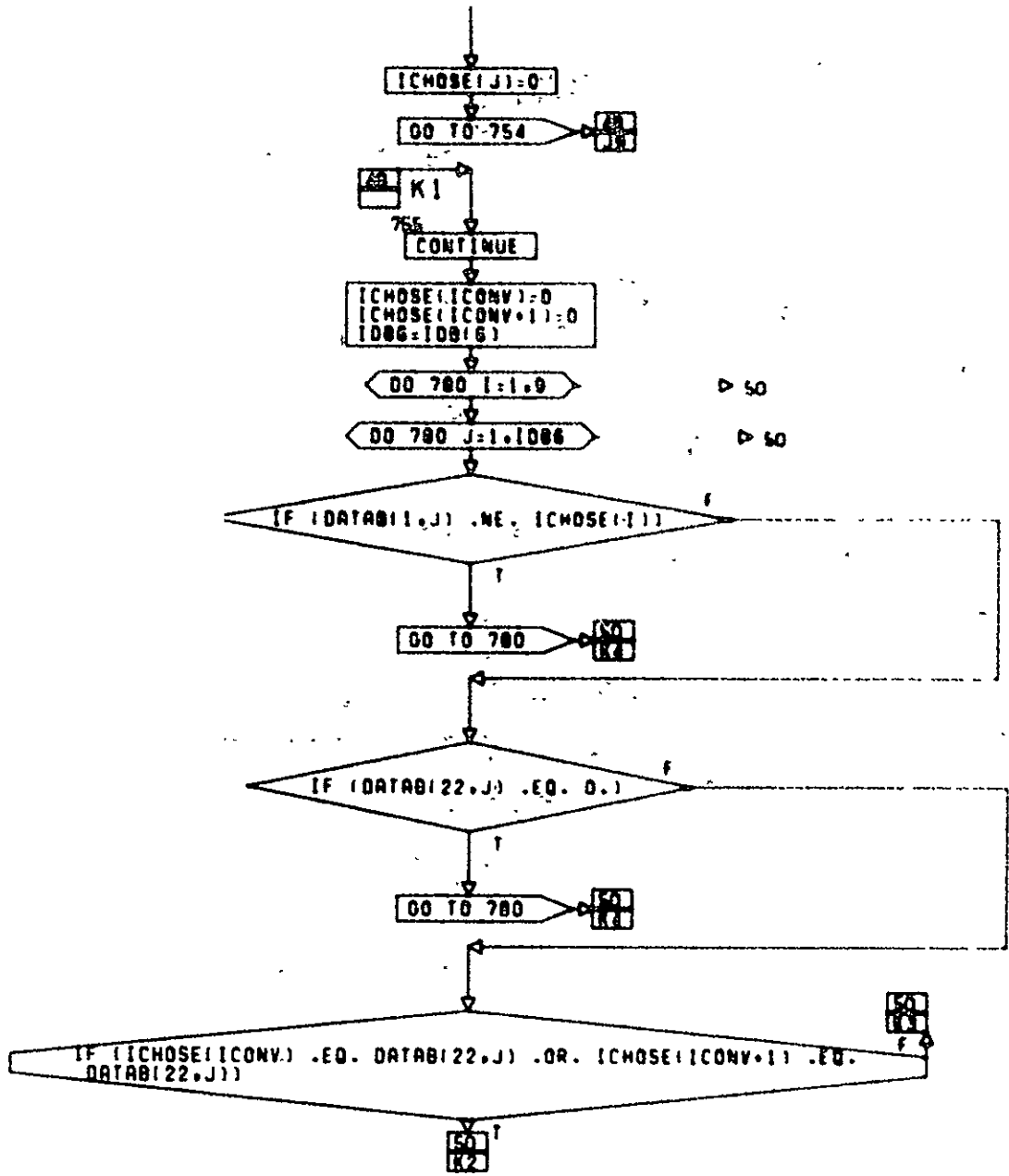
876





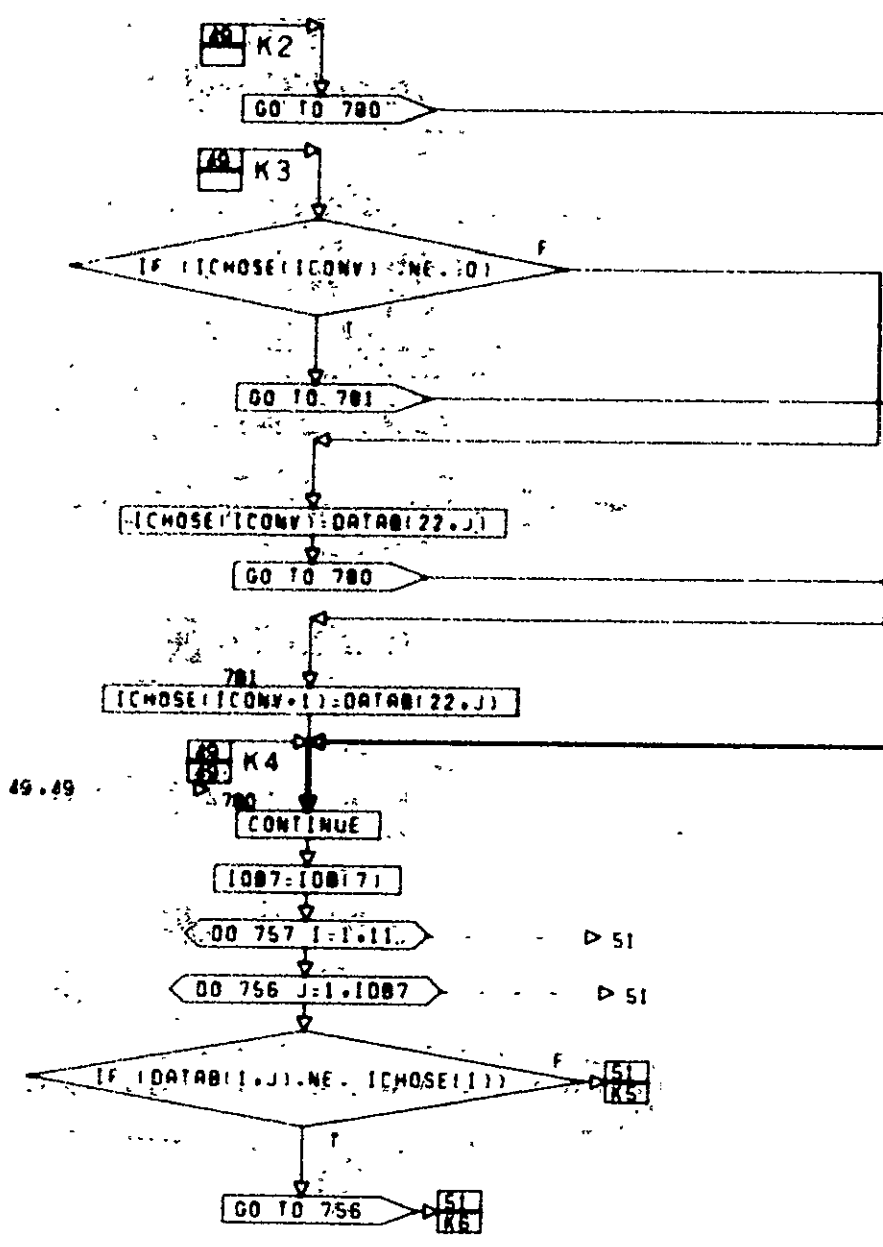
CONT. ON PG 49

PG. 40E 52



CONT. ON PG 50

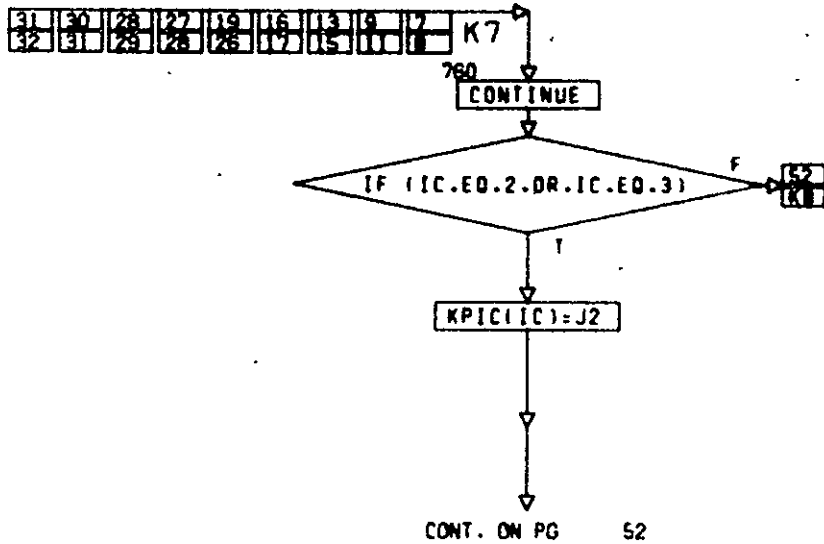
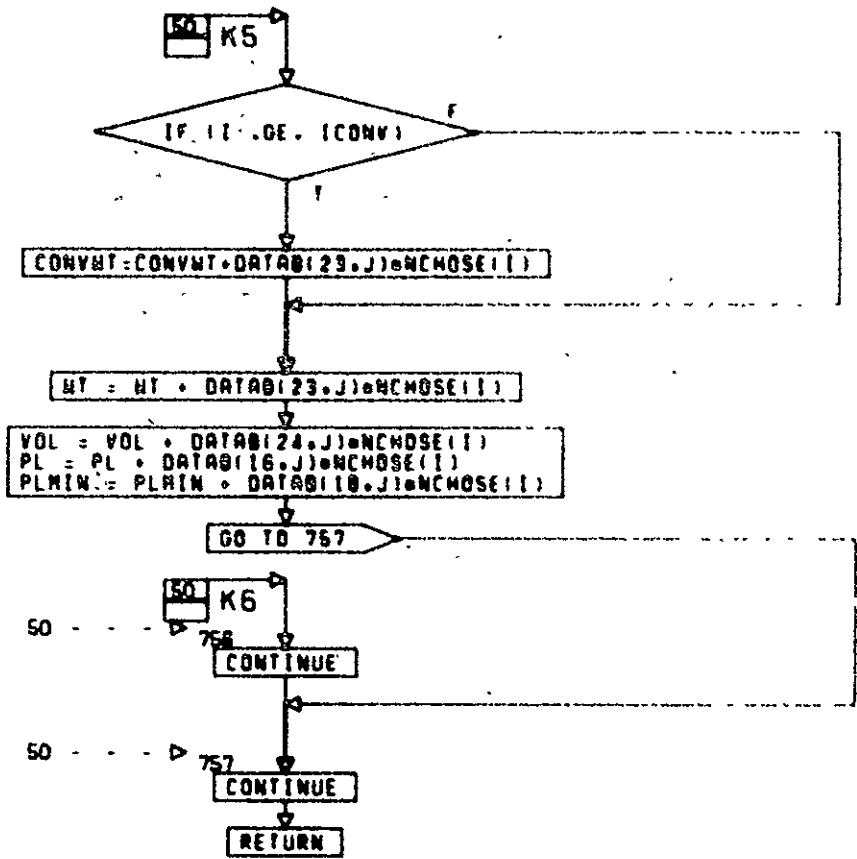
PG 48F 52

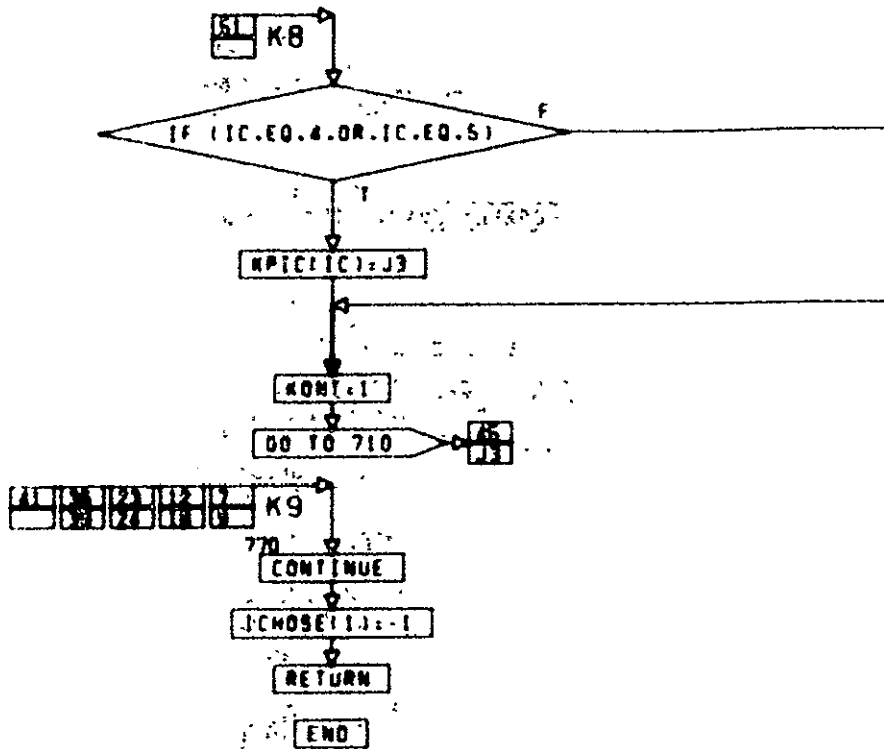


49.49

CONT. ON PG 51

PG 50DF 52

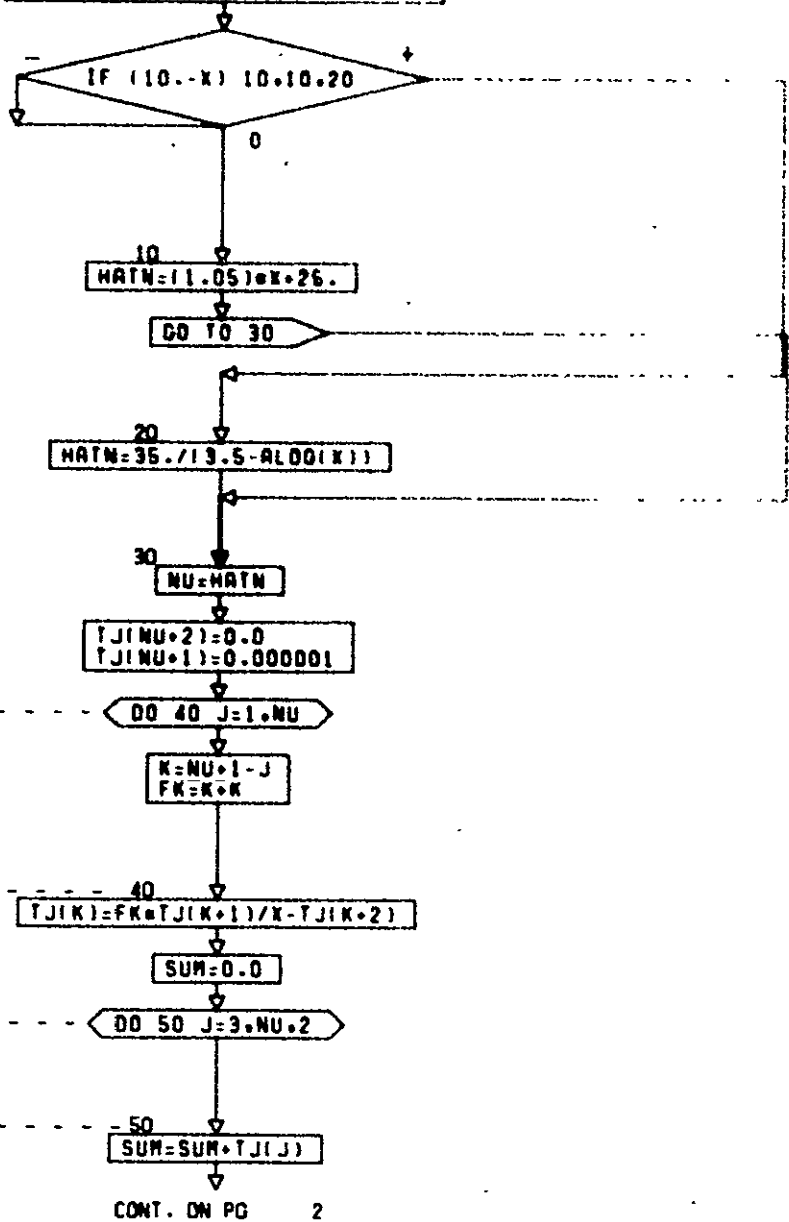




```

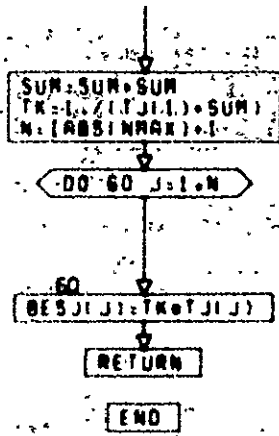
SUBROUTINE BESS (X,BESS,NMAX)
DIMENSION BESS(1), T(200)
EULER=0.577215664901533
PI=2.0/3.141592653589793
NU2=20

```



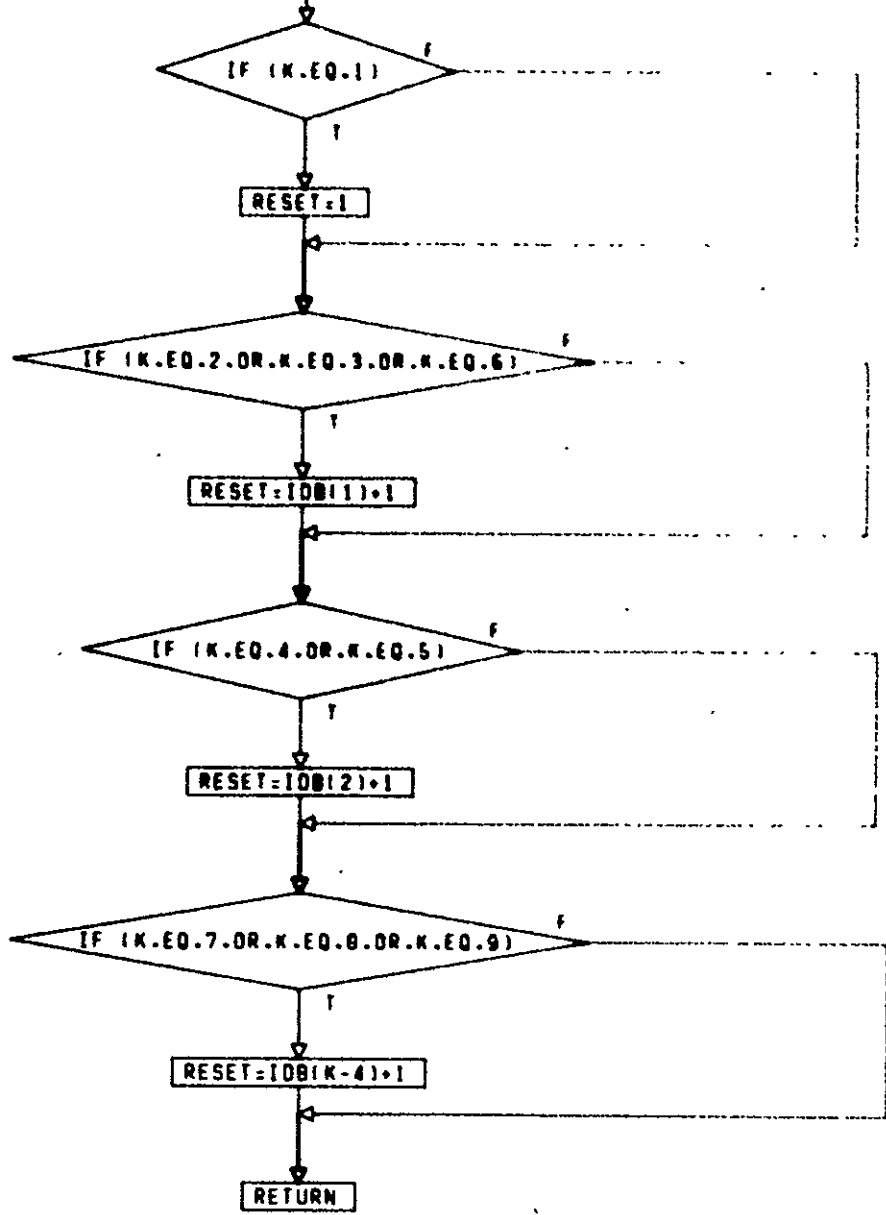
CONT. ON PG 2

PG 1 OF 2



PG 2 FINAL

INTEGER FUNCTION RESET(K)  
COMMON /DBCON/IOB(30),DATA0(55,90)



CONT. ON PG 2

PG 1 OF 2

002



END

PG 2 FINAL

SUBROUTINE SKEEINEQUIP,NCONF)  
COMMON /USER0/SNAME(7,3)

COMMON /CMOSE/(CMOSE(60),NCMOSE(60),COST(5,60),REL(6,60),  
TMR(4,60),DPIAI(11,60),DSSKEDI(7,60)

COMMON /PATCON/ACCRCY,CISTAR,IREL,AMOLD,TRUNC,ITRUNC,DE,TE,  
TOOLR,QCR,SEIR,PNR,PE,PU,TOOLU,QCP,SEIP,PNP,STAR,SATINV,REQ,  
NEINV,PAYR,PAYINV,PAYOUL,QSE,HLTOT,CTOT,FEEB,FEEINV,ODE,VEST,  
DPS,TSAVE(6),ROLD(6),TTTT,AN,TS,BS,AM,TF,OF,TC,TA,TB,TOTOPS

DIMENSION CONF(22,5),TSUB(6),ICI(5),NEQUIP(5),NCONF(6)  
DATA ICI/0,5,8,10,15/

DATA CONF/1.,1.5,1.,2.,1.5,3.,1.,2.,12.,1.,2.,.  
6.,9.,8.,12.,9.,5.,8.,0.,4.,6.,2.,6.,4.,2.,.  
22.,7.,22.,7.,E-7,5.,0.0001,3.,0.0002,13.,0.0007.,0.0002/

FK=4.5

C CONF ROWS AREZ 1 TO 5 FOR S AND C  
C 6 TO 8 FOR AUXPRO  
C 9 TO 10 FOR DPI  
C 11 TO 16 FOR CONW  
C 16 TO 21 FOR EP  
C 22 FOR N E

DO 1 J=1,6

TSAVE(J)=0.

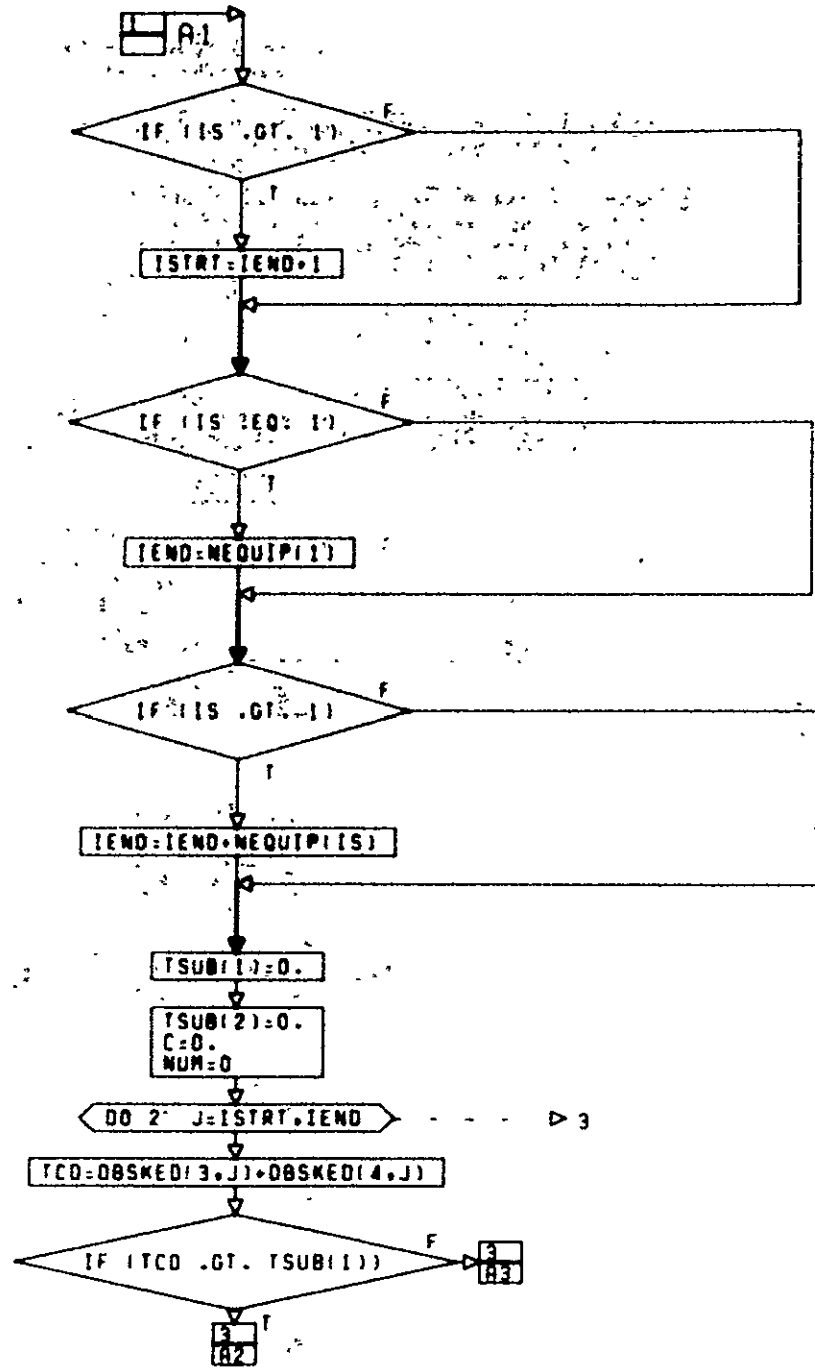
DO 4 IS=1,5

IF (IS .EQ. 1)

ISTAT=1

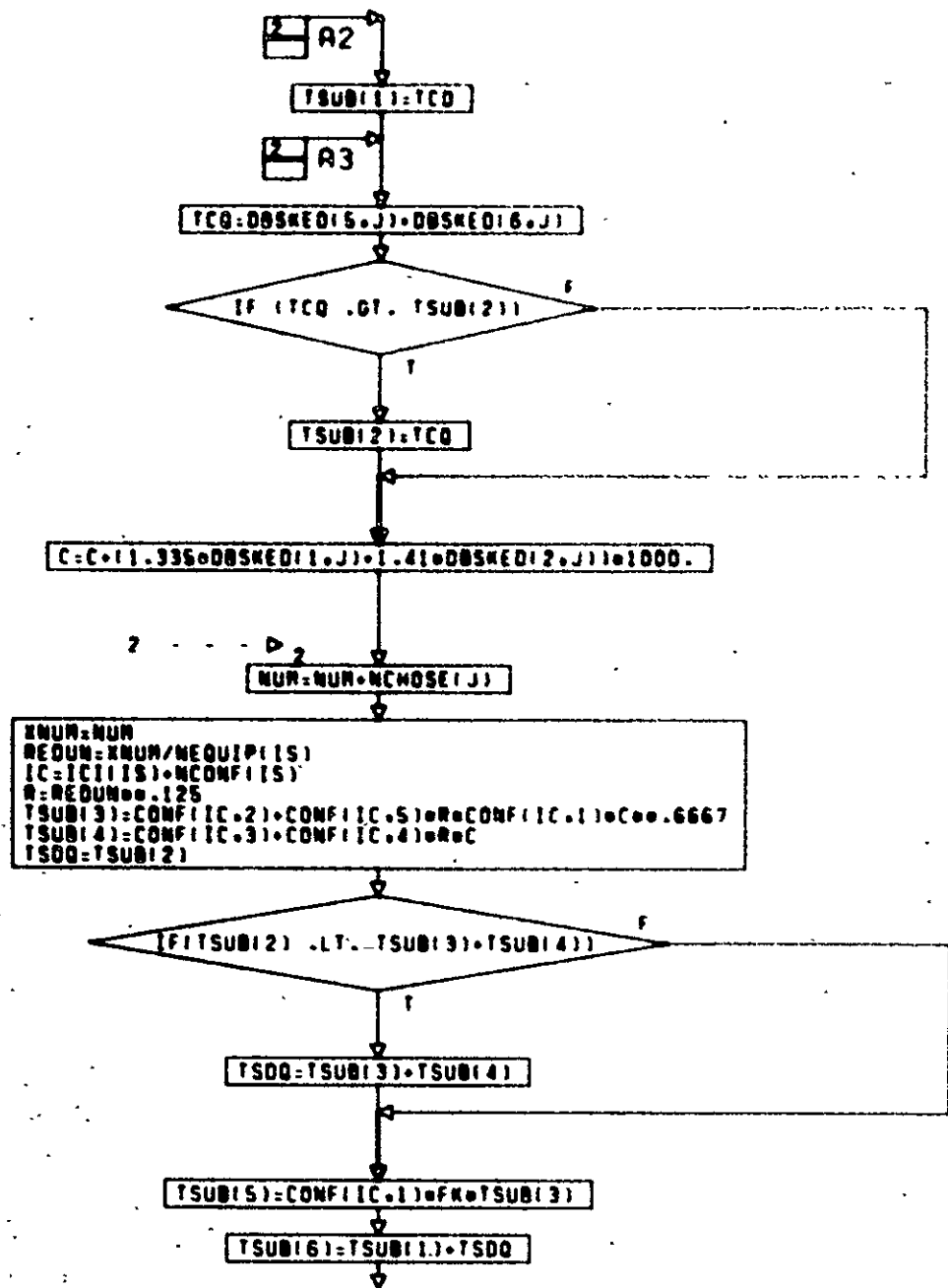
CONT. ON PG 2

PG 1 OF 7



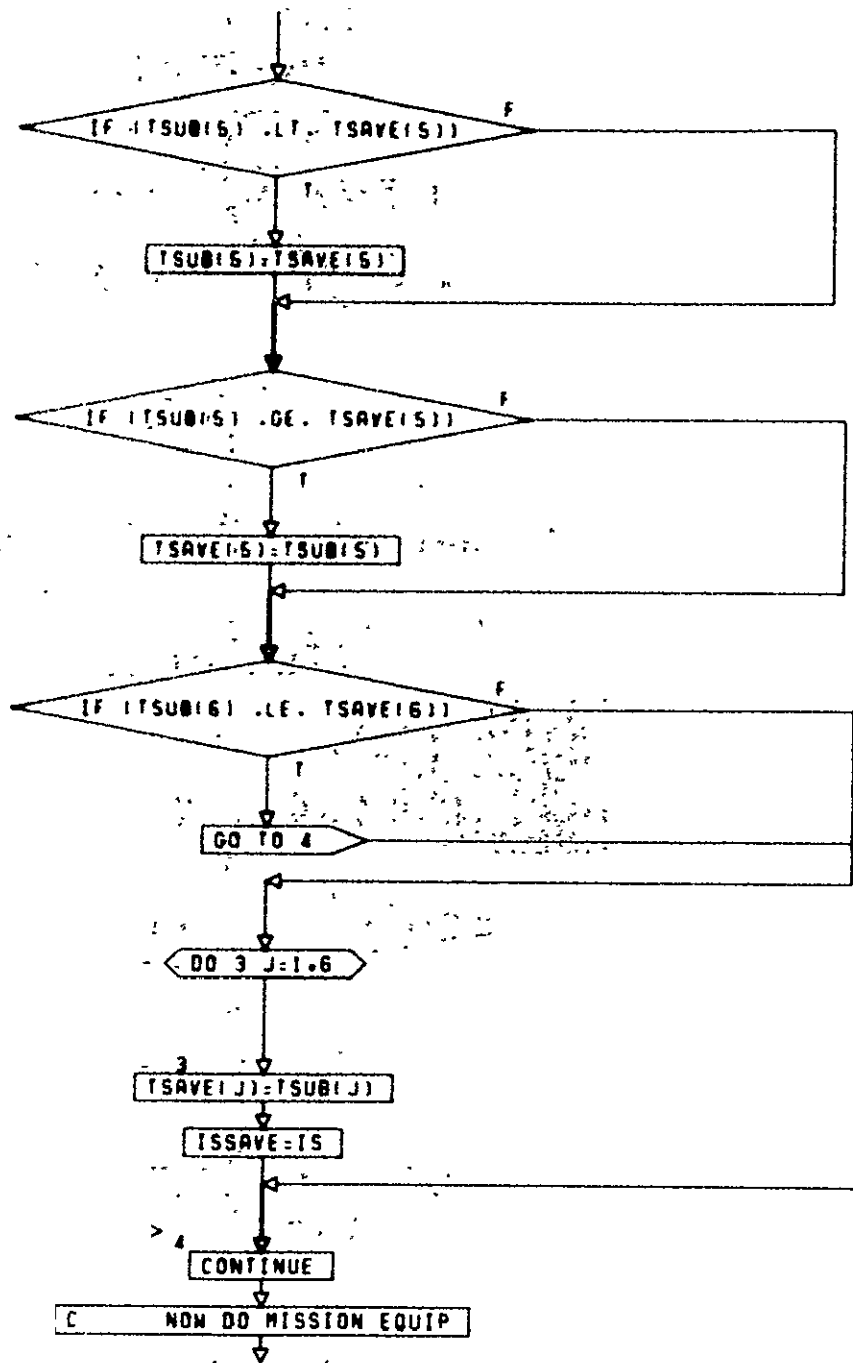
CONT. ON PG 3

PG 2 OF 7



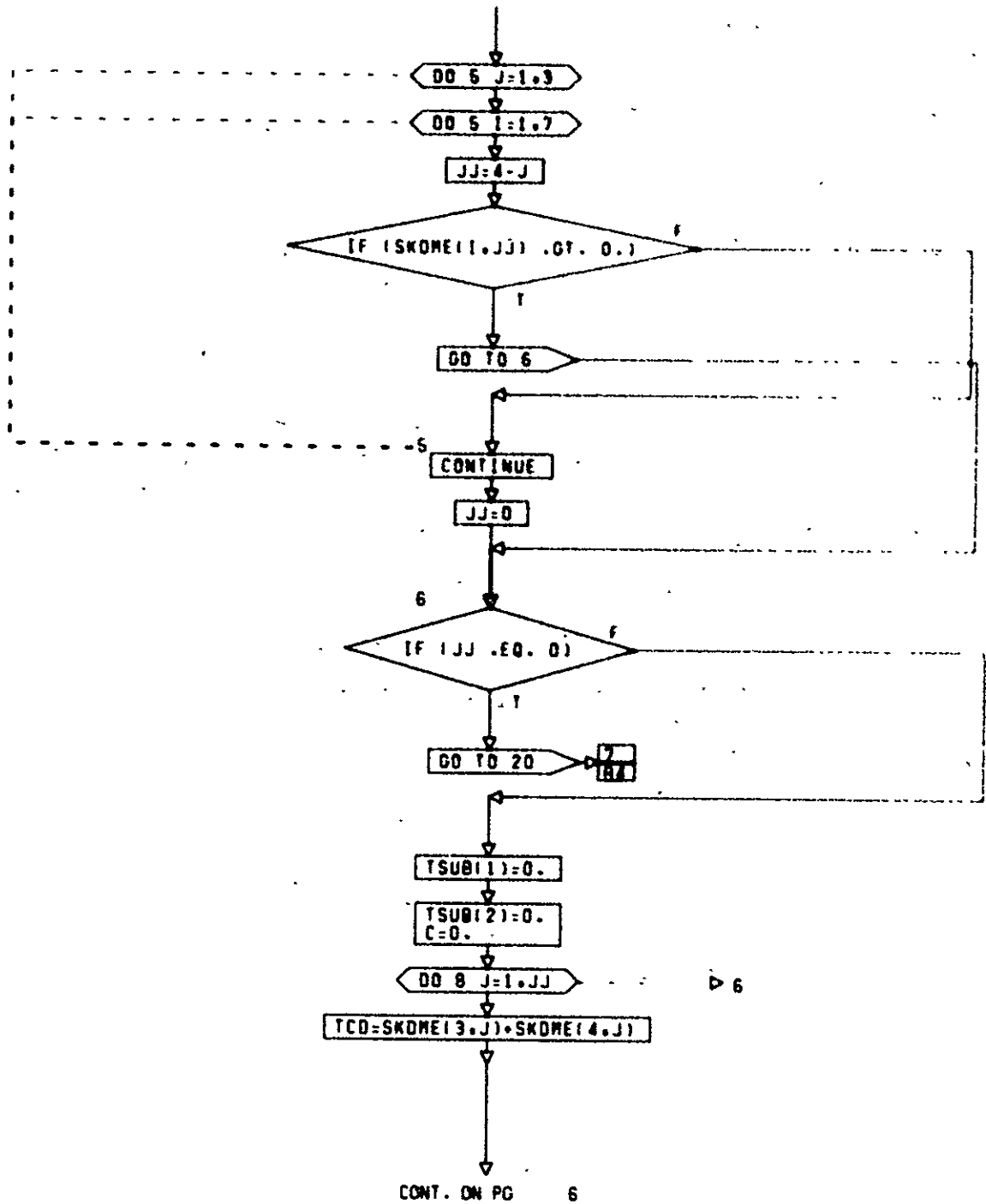
CONT. ON PG 4

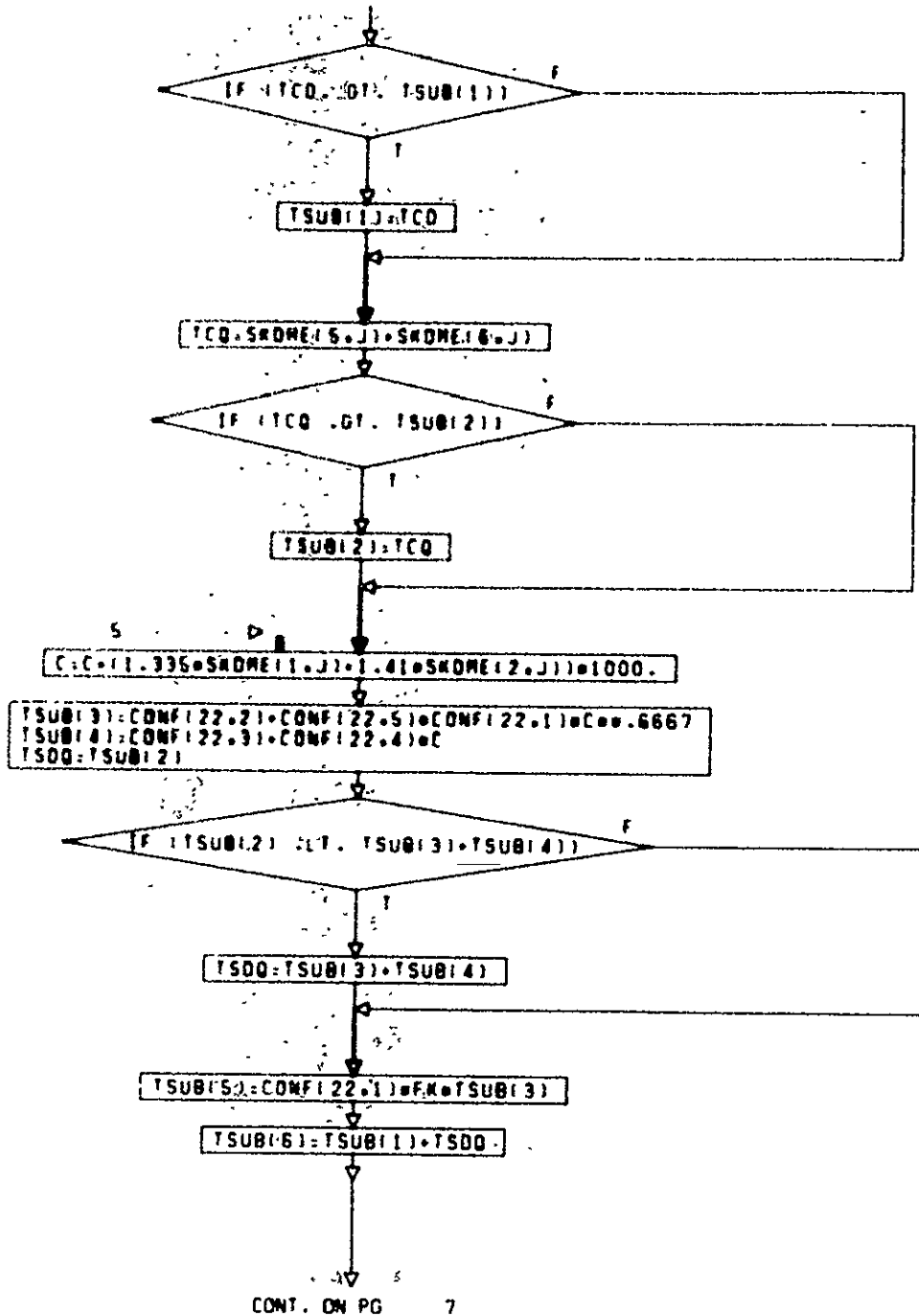
PG 3 OF 7

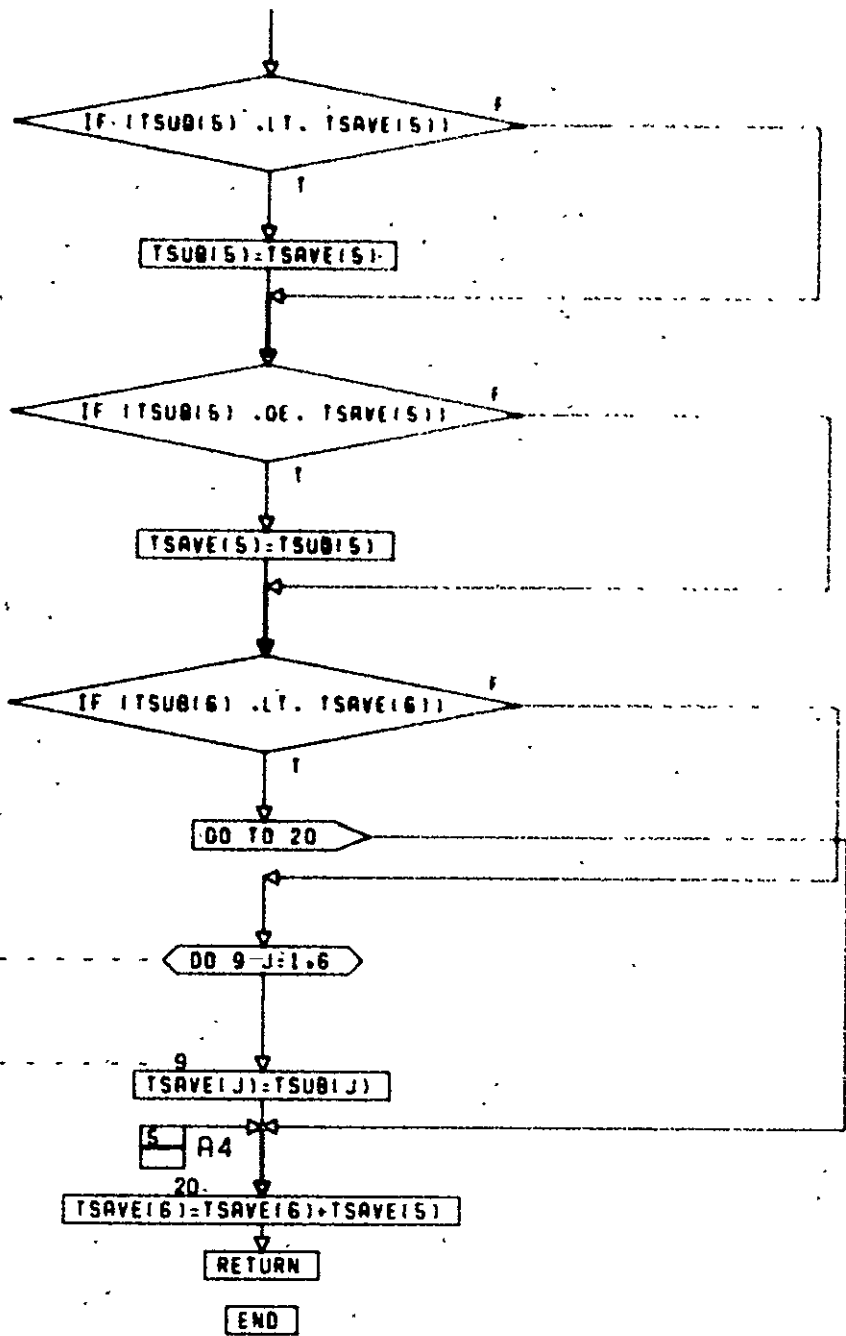


CONT. ON PG 5

PG 4 OF 7







PG 7 FINAL



SUBROUTINE SANDC(IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

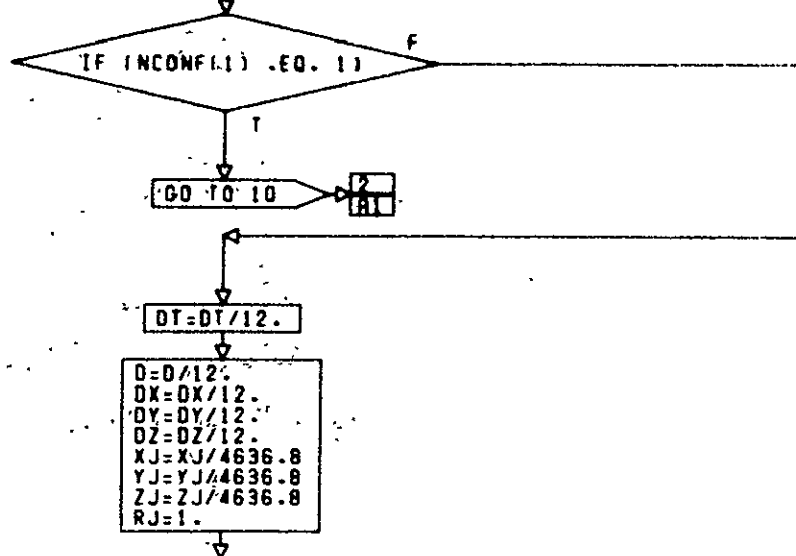
C ICHOSE(10) IS SELECTED EQUIP AS FOUR DIGIT EQUIP. -- NAME  
C NCONF IS CONFIGURATION NUMBER, ITER IS NUMBER OF THIS ITERATION  
C IERR IS A MULTIPLE MESSAGE ERROR FLAG, IPIC IS THE LAST  
C SET OF SUBSCRIPTS CHOSEN  
C COMMON USER LISTS USER INPUT PARAMETERS  
C COMMON BTWN LISTS NECESSARY COMMUNICATION BETWEEN SUBROUTINES  
C COMMON CDATA HAS LAST SUBSCRIPT FOR EACH PIECE OF EQUIP, AND  
C THE NECESSARY PIECE OF THE DATA BASE

DIMENSION ICHOSE(9), IPIC(3), ES(6), C(5), DWA(2), G(3), F(9), NCHOSE(9)  
DIMENSION NCONF(6)

COMMON /USER1/DPHI, FE, TSMALL, XNU, POTO, TAUX, TAY, TAUZ, T,  
PHIRX, PHIRY, PHIRZ, POUTX, POUTY, POUTZ, XN, YN, ZN, POUTX, POUTY,  
POUTZ, OMEG, OMEGR, PJ, XNW, K, MANY, IPAYW, EPI, AK, AY, AZ,  
EA, EANT, ALPHA, TL, TACCEL, XNN, THOLD, POUTAV, POUTST, PHIFOV, ISAT

COMMON /BTWN/ HT, VOL, DT, D, DX, DY, DZ, XJ, YJ, ZJ, RJ, FF, TI, PL, PLIN,  
LMBDO, AREA, SATLG, WATE, NC, ACSMP, HANMT, TNCMT, CONVMT, TNKMT, PASSTR,  
SATWT, TPRIN, IBTLOC, RADA, RADAB, RAT, HTRPR, PTRPRB,  
HPT, HTPPE, VCHP, HTPT, FC, XNZERO, COMRT, ACSSN, BITRAT(2),  
EQBLG, SABOLD, SATWT

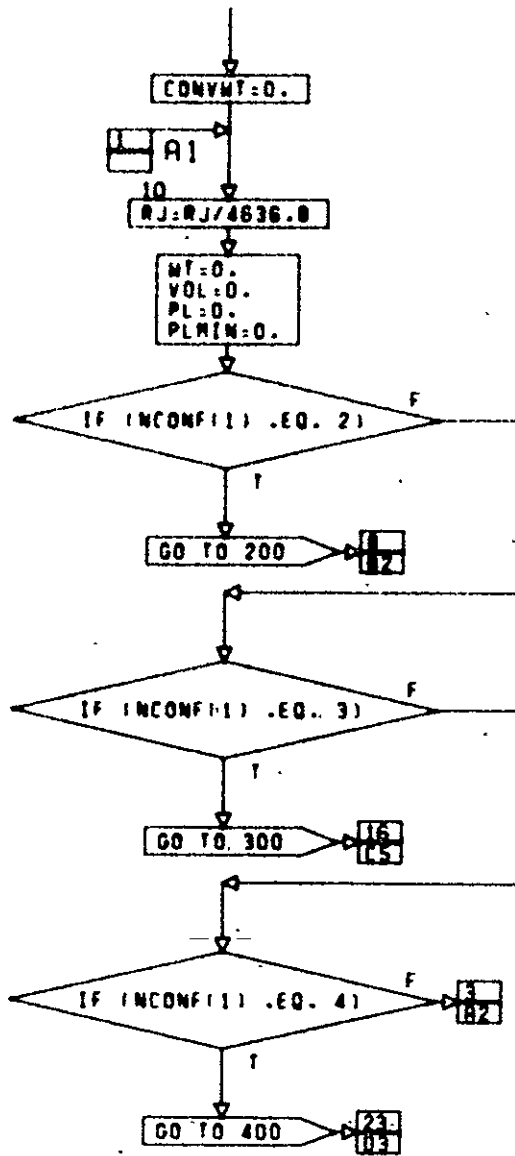
COMMON /DBCOM/IDB(30), DATAB(55,90)  
COMMON /USER1/EDM1WT, EDM2WT, DIAMAX, ALT  
DATA XMD, YMD, ZMD, D1, XMD2, YMD2, ZMD2/3, .0003, .03, 3, .04/  
ACSSN=2.



CONT. ON PG 2

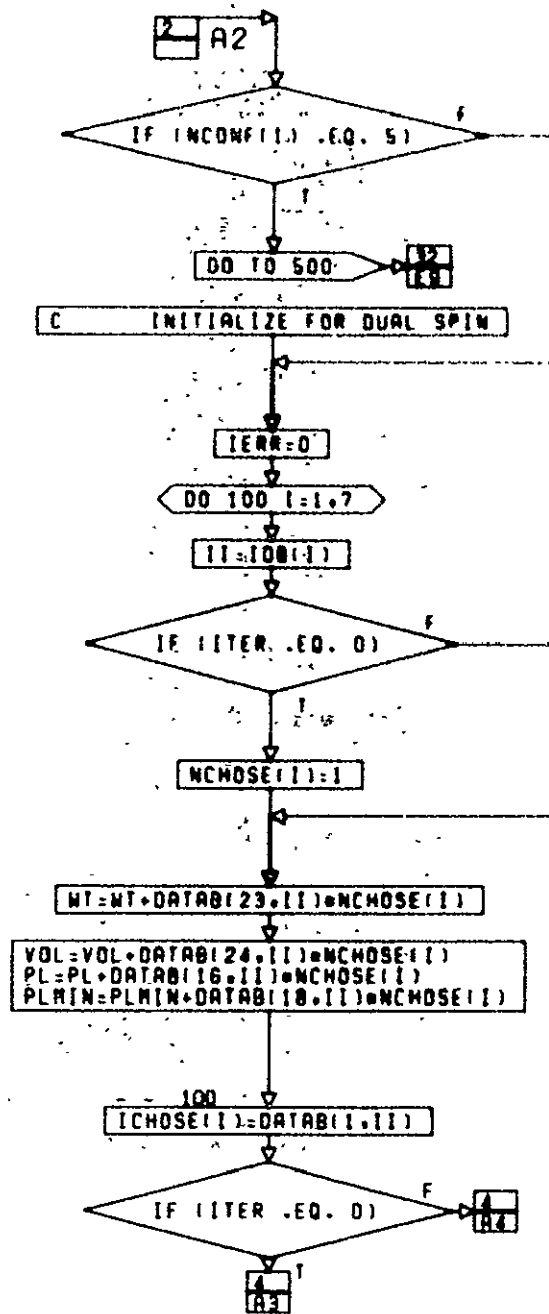
PG 1 OF 37

ORIGINAL PAGE IS  
OF POOR QUALITY



CONT. ON PG

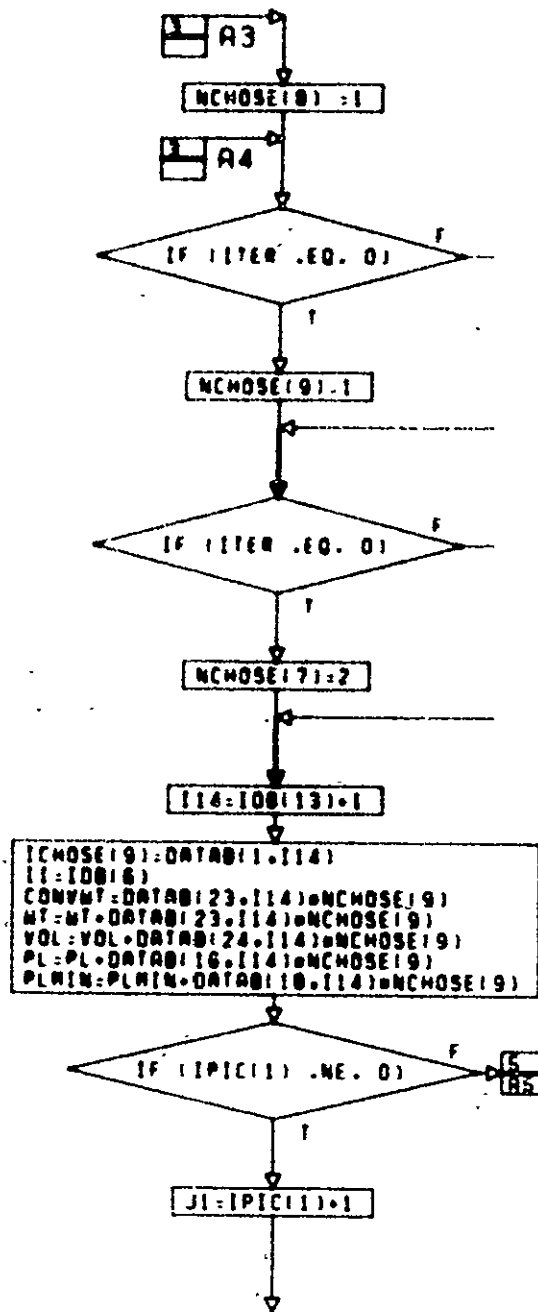
PG 2 OF



CONT. ON PG. 4

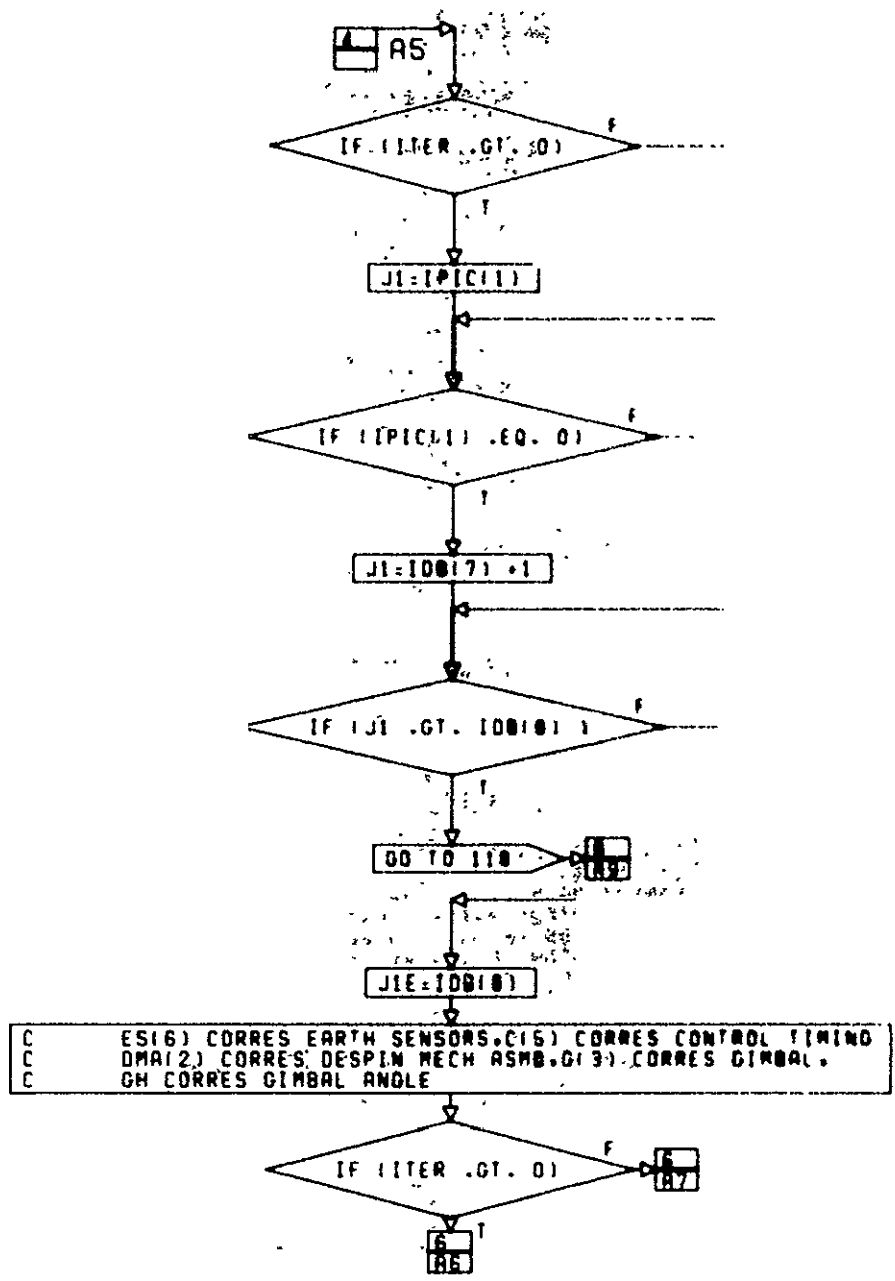
PG 3 OF 37

030



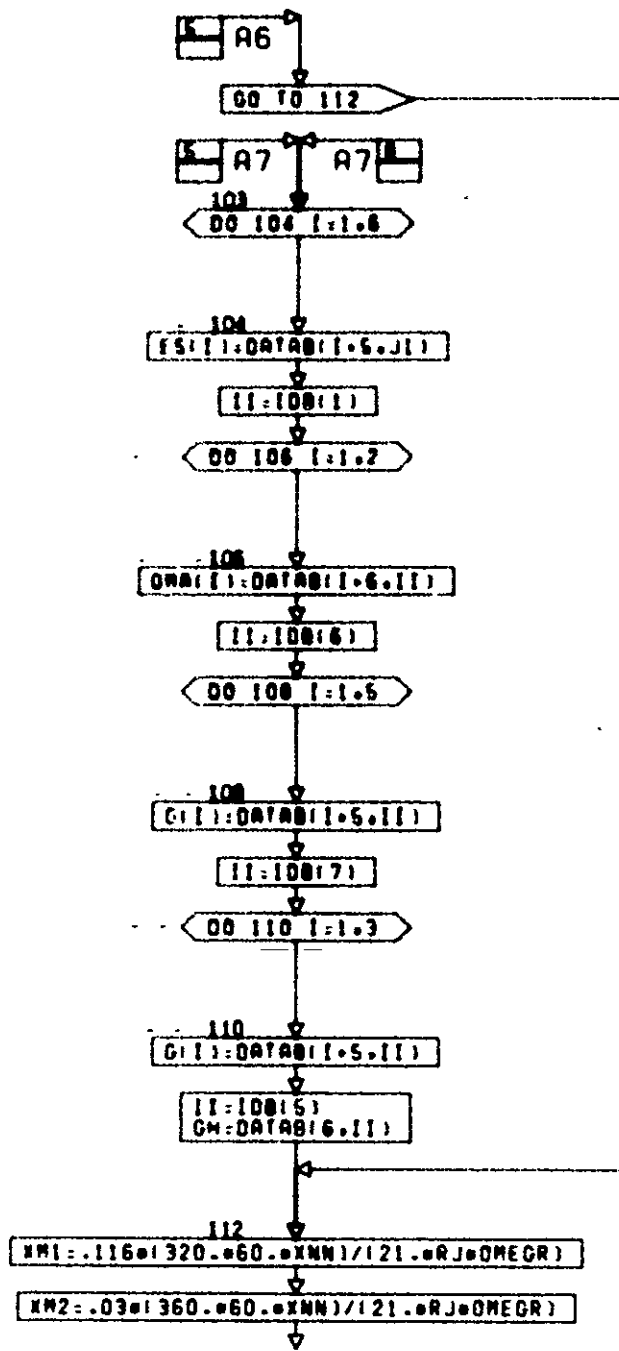
CONT. ON PG 5

PG 4 OF 37



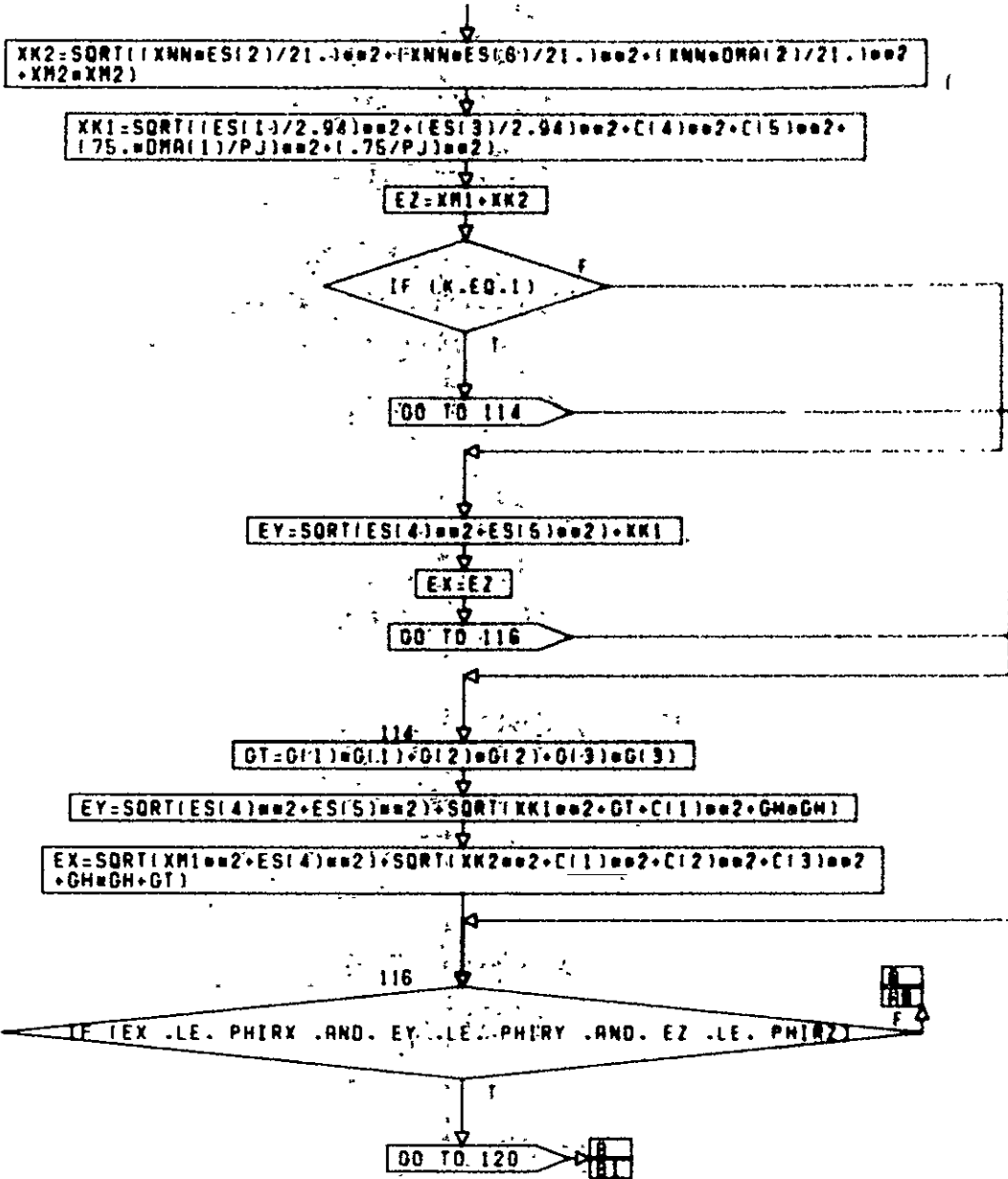
CONT. ON PG

PG 5 OF 37



CONT. ON PG 7

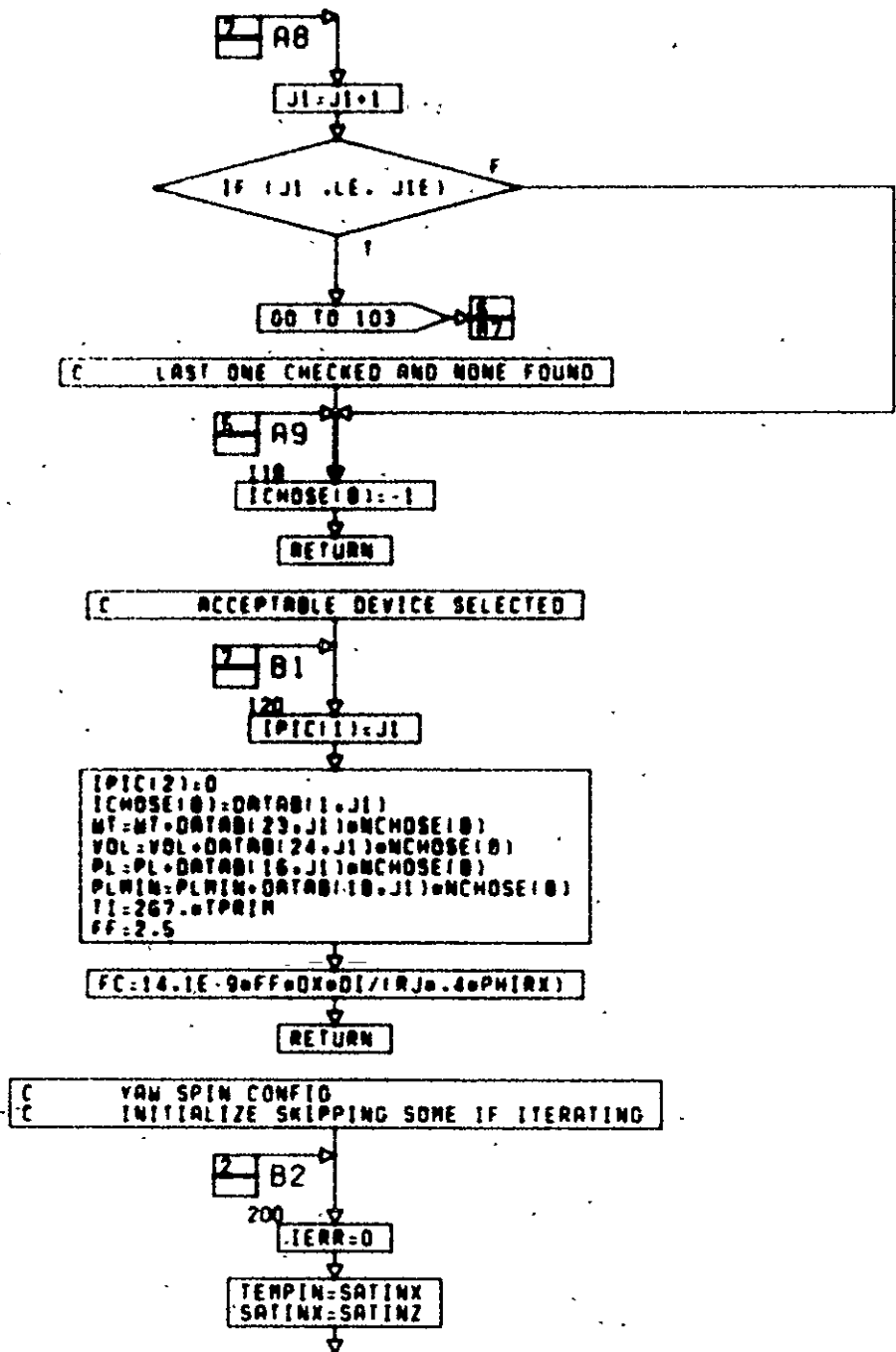
PG 6 OF 37



CONT. ON PG 8

PG 7 OF 37

032



CONT. ON PG 9

PG. 8 OF 37



SATINZ=TEMPIN  
I1=IDB(8)+1  
ICHOSE(1)=DATAB(1,I1)  
I2=IDB(9)+1  
I3=IDB(10)+1  
ICHOSE(2)=DATAB(1,I2)

ICHOSE(3)=DATAB(1,I3)  
I14=IDB(13)+1  
ICHOSE(6)=DATAB(1,I14)  
I7=IDB(2)  
ICHOSE(7)=DATAB(1,I7)

IF LITER .GT. 0

GO TO 203

DO 202 I=1,9

202 NCHOSE(I)=1

203 WT=WT+NCHOSE(1)\*DATAB(23,I1)+NCHOSE(2)\*DATAB(23,I2)+NCHOSE(3)\*  
DATAB(23,I3)+NCHOSE(6)\*DATAB(23,I14)+NCHOSE(7)\*DATAB(23,I7)

CONVWT=DATAB(23,I14)\*NCHOSE(6)

VOL=VOL+NCHOSE(1)\*DATAB(24,I1)+NCHOSE(2)\*DATAB(24,I2)+NCHOSE(3)\*  
DATAB(24,I3)+NCHOSE(6)\*DATAB(24,I14)+NCHOSE(7)\*DATAB(24,I7)

PL=PL+NCHOSE(1)\*DATAB(16,I1)+NCHOSE(2)\*DATAB(16,I2)+NCHOSE(3)\*  
DATAB(16,I3)+NCHOSE(6)\*DATAB(16,I14)+NCHOSE(7)\*DATAB(16,I7)

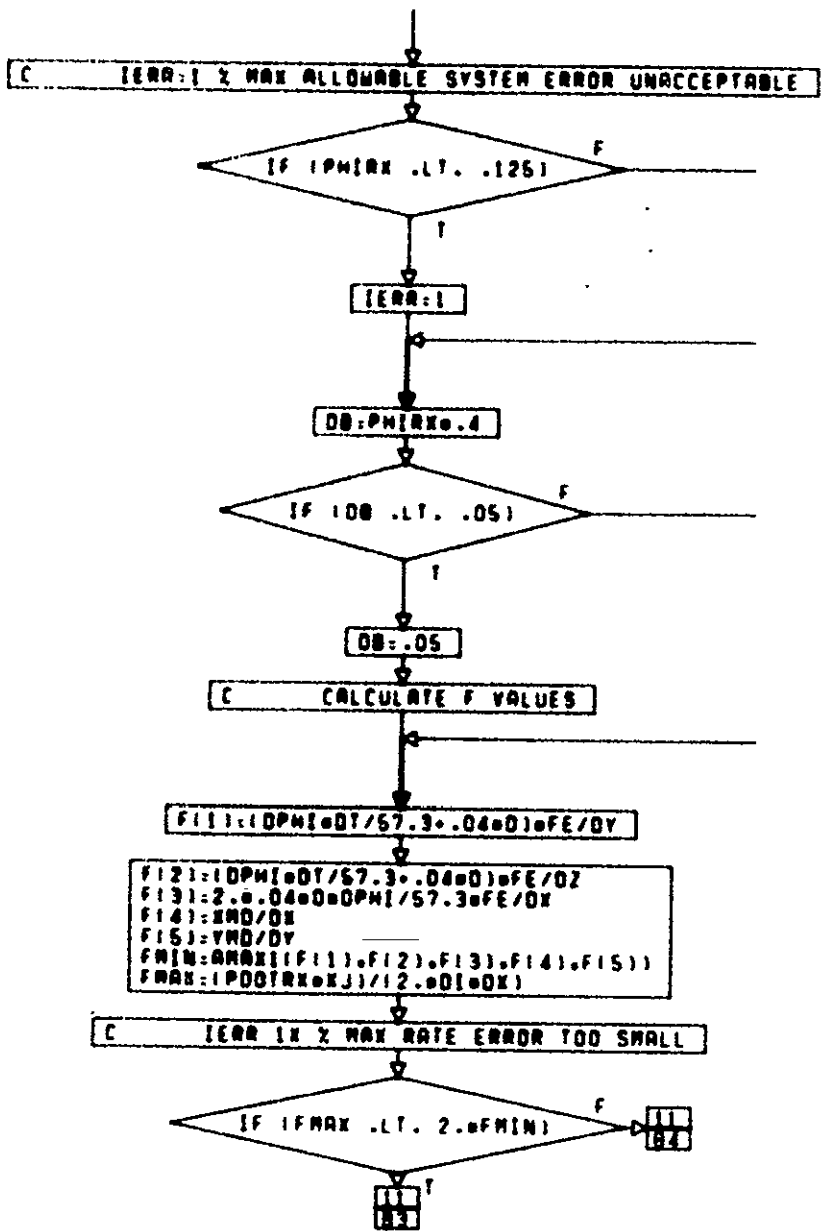
PLMIN=PLMIN+NCHOSE(1)\*DATAB(18,I1)+NCHOSE(2)\*DATAB(18,I2)+  
NCHOSE(3)\*DATAB(18,I3)+NCHOSE(6)\*DATAB(18,I14)+NCHOSE(7)\*  
DATAB(18,I7)

ICHOSE(8)=0  
ICHOSE(9)=0

CONT. ON PG 10

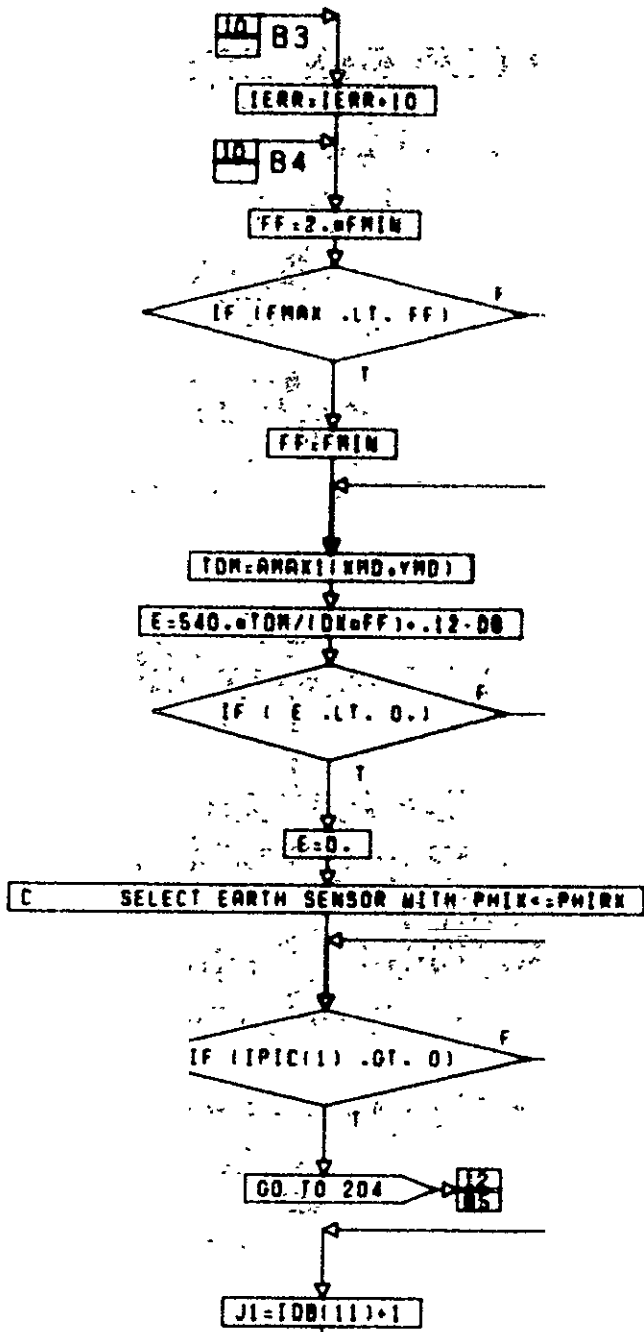
PG 9 OF 37

093



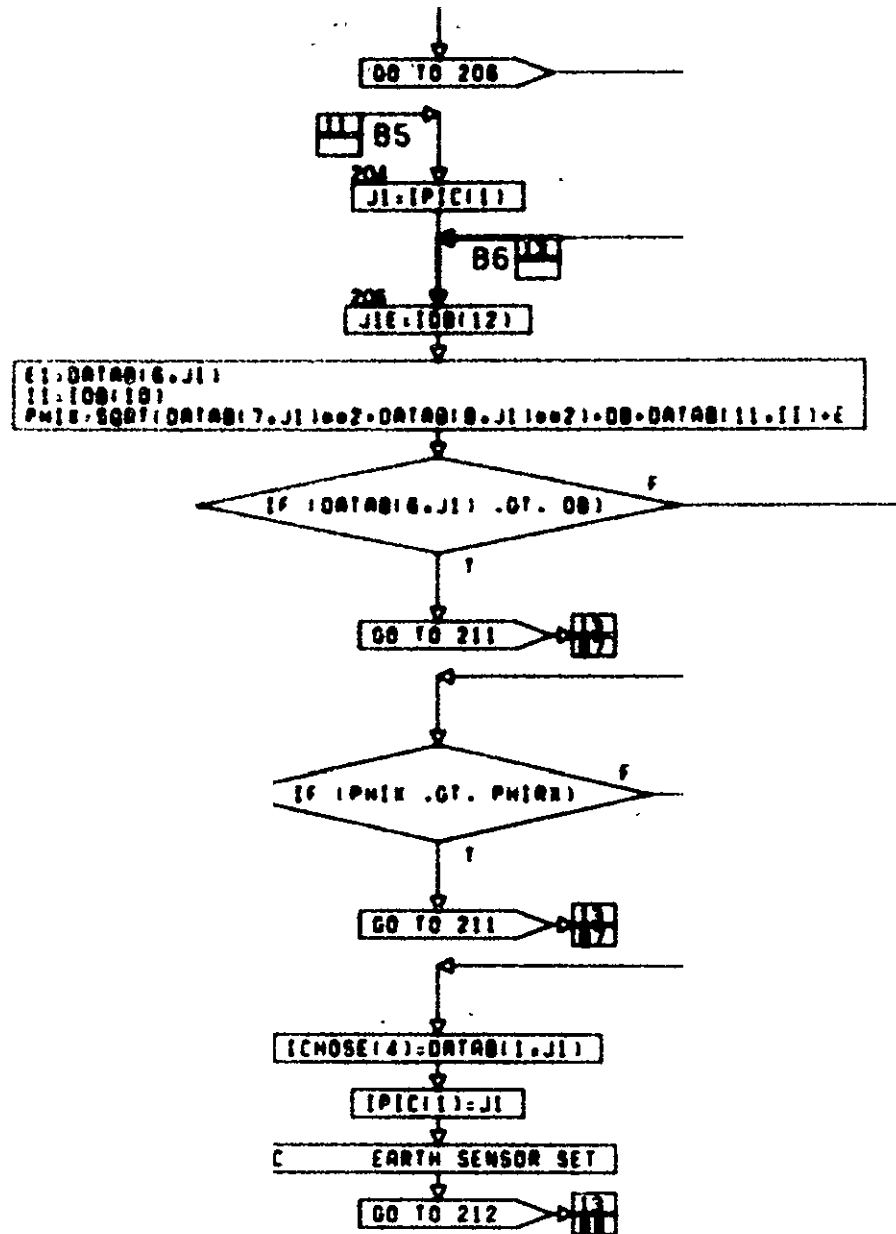
CONT. ON PG 11

PG 10F 37



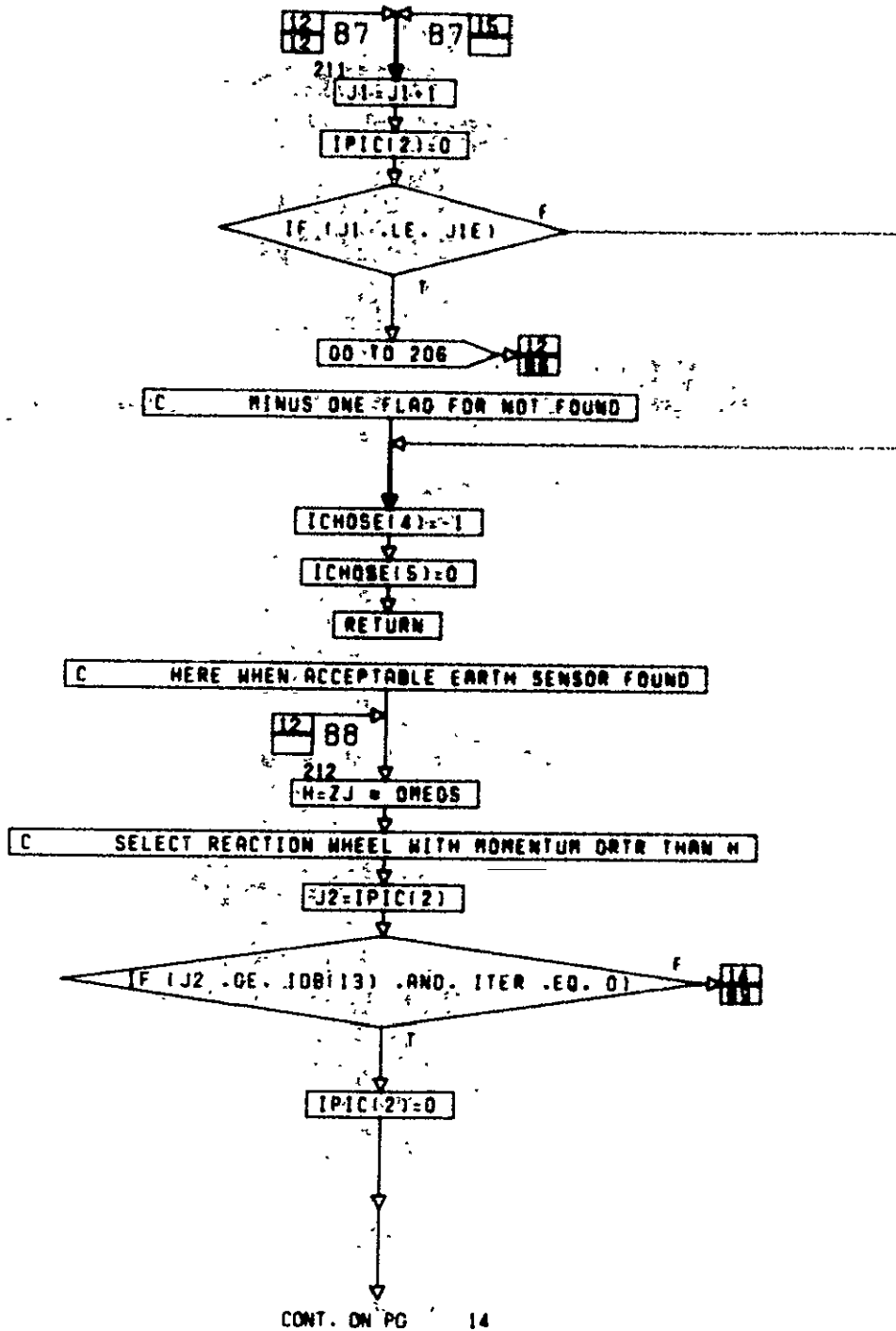
CONT. ON PG 12

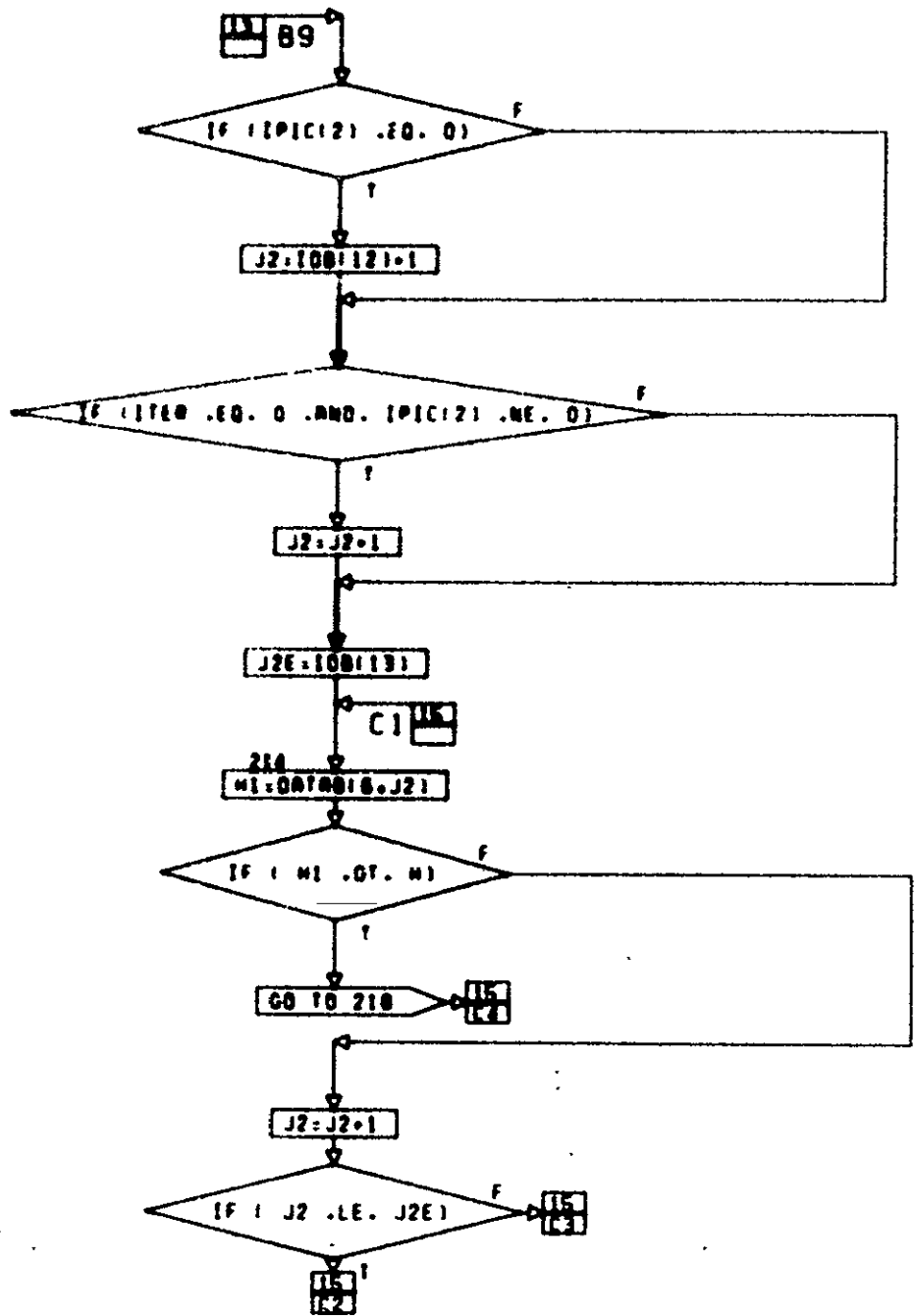
PG 1 OF 37



CONT. ON PG 13

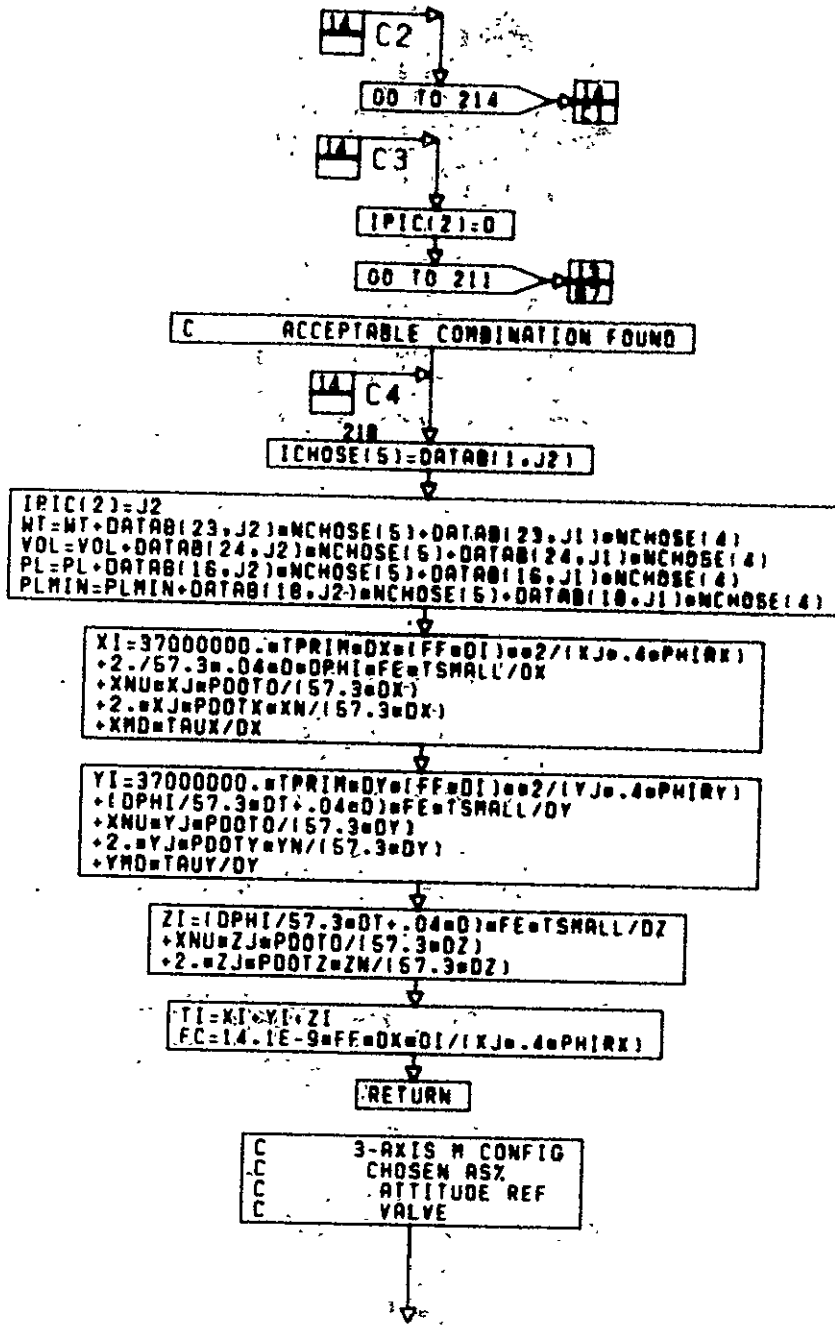
PG 12F 37





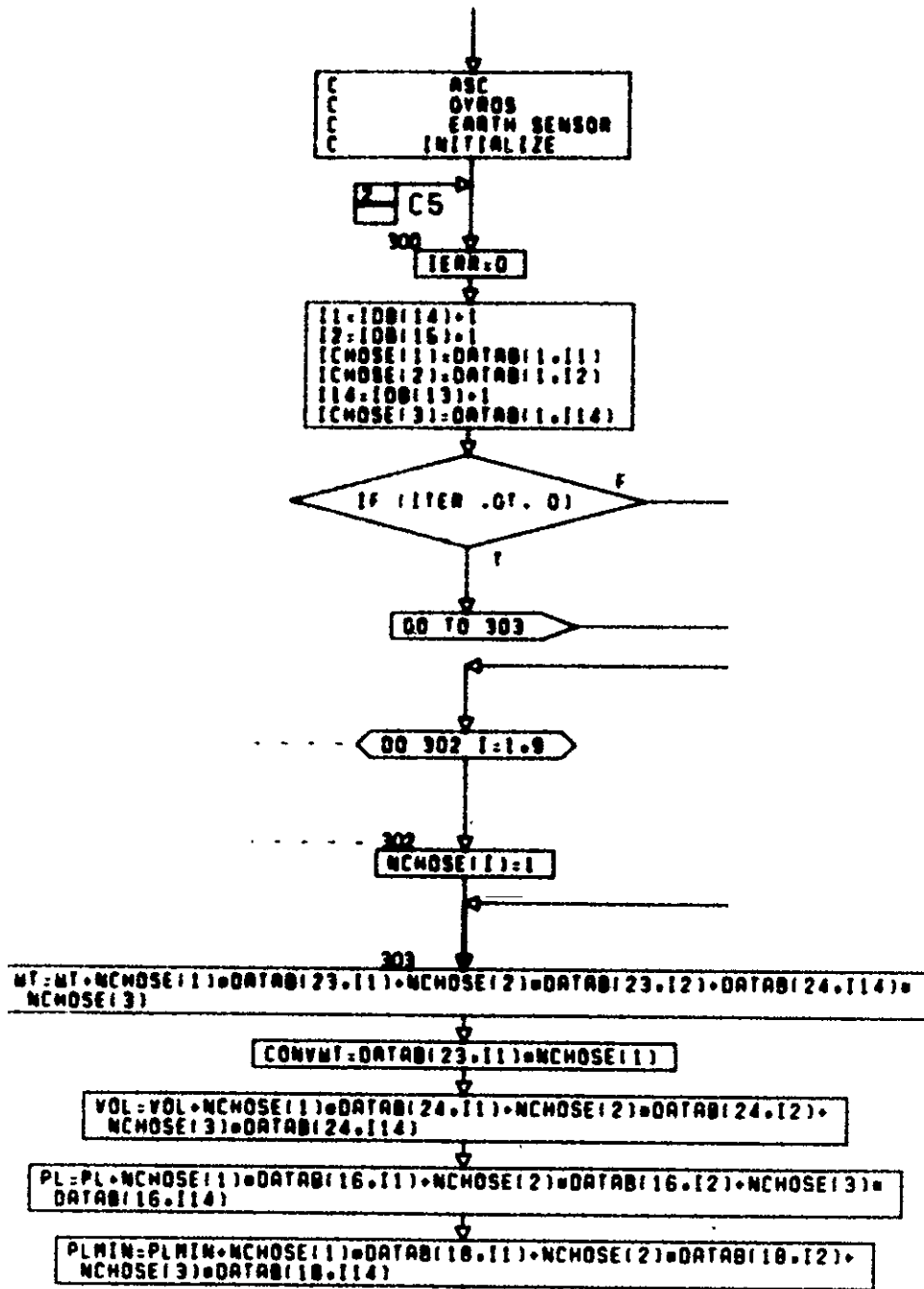
CONT. ON PG 15

PG 1 OF 37



CONT. ON PG 16

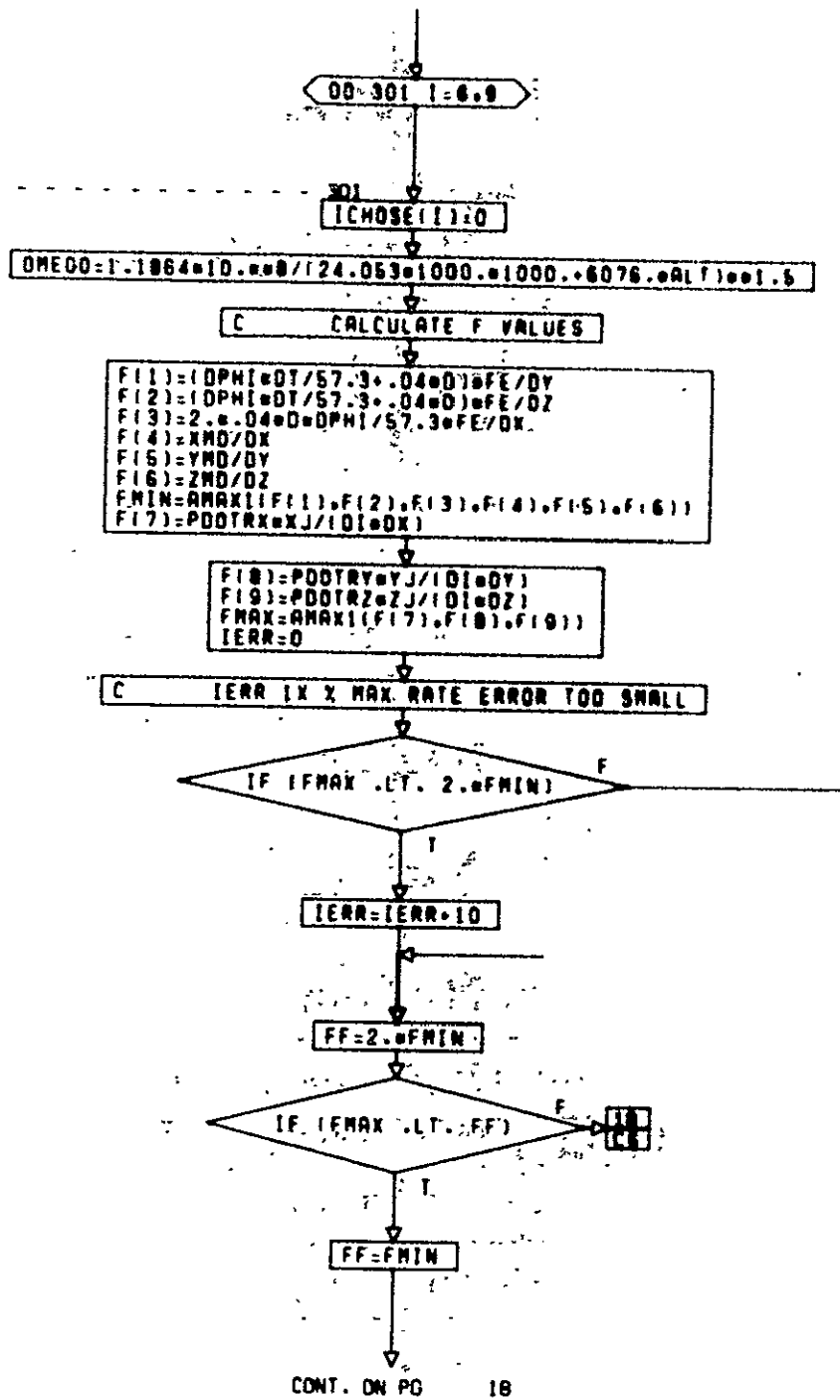
PG 15F 37

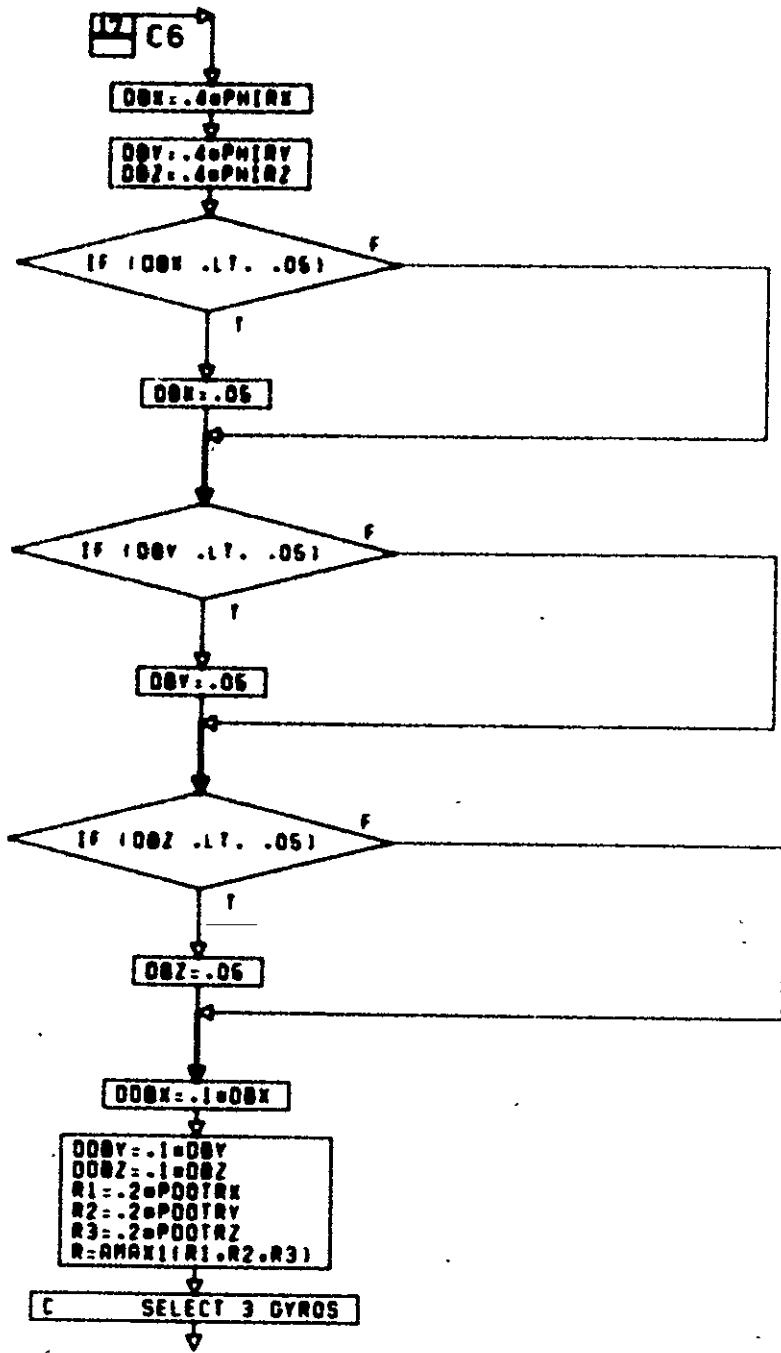


CONT. ON PG 17

PG 18E 37

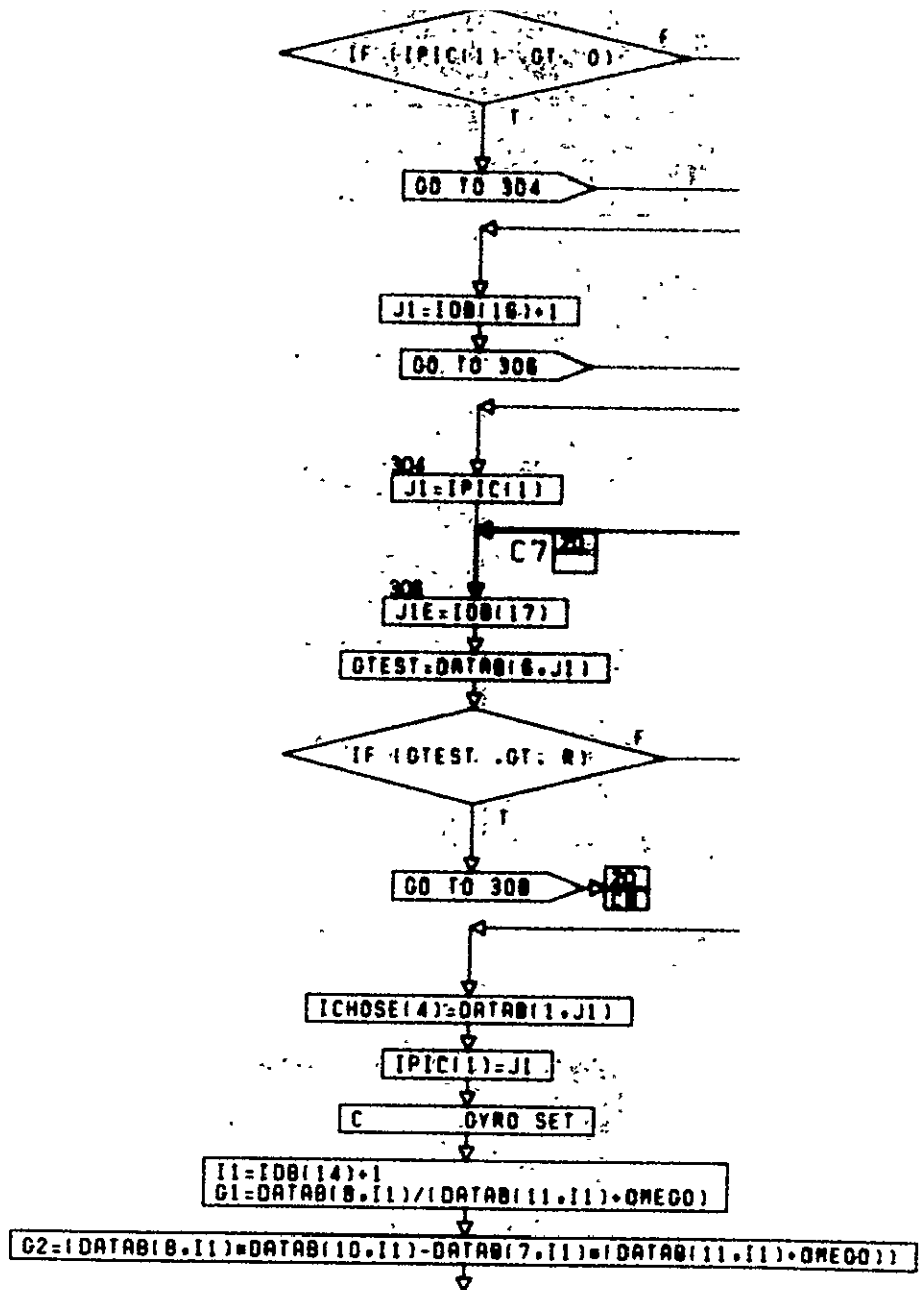




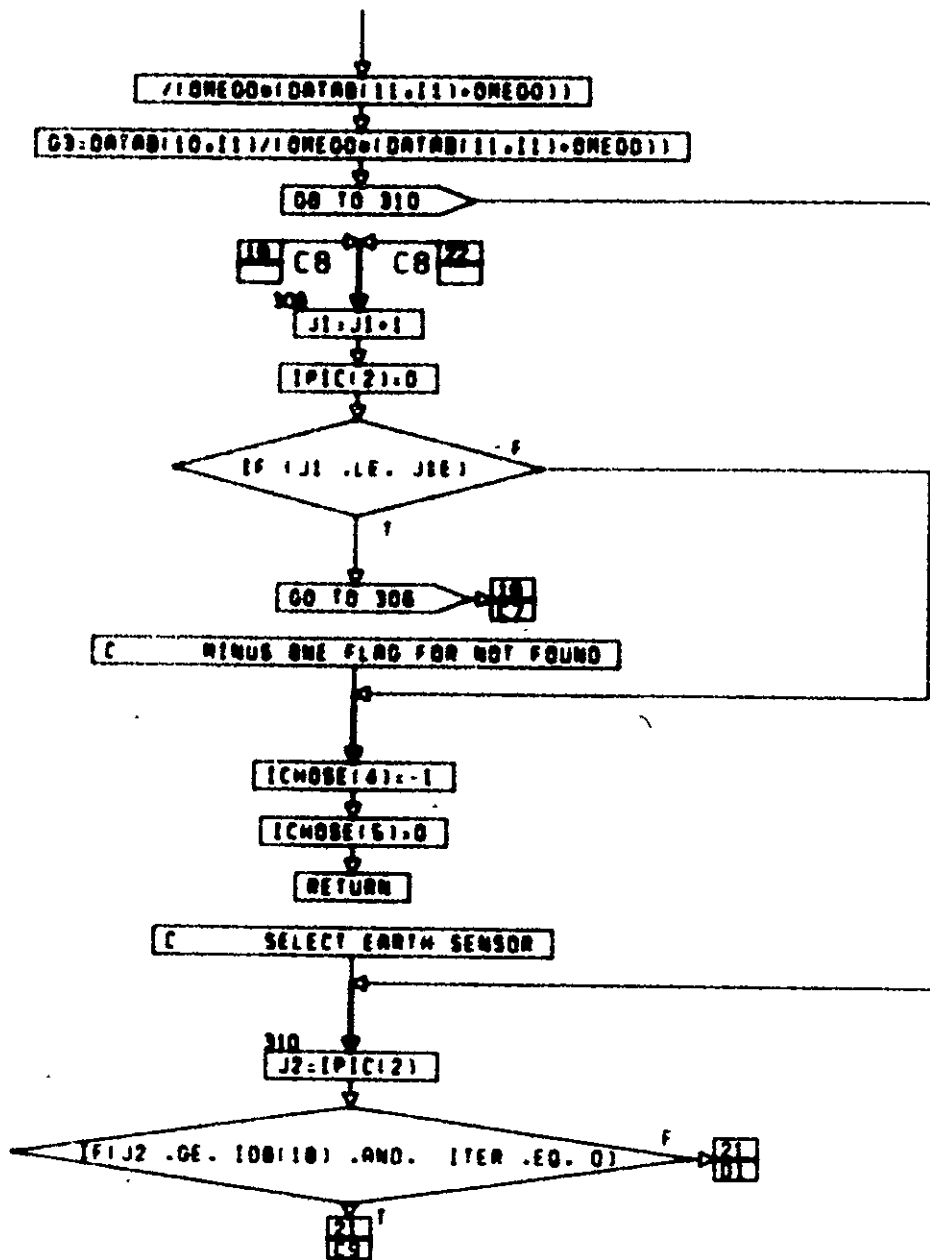


CONT. ON PG 19

PG 18F 37

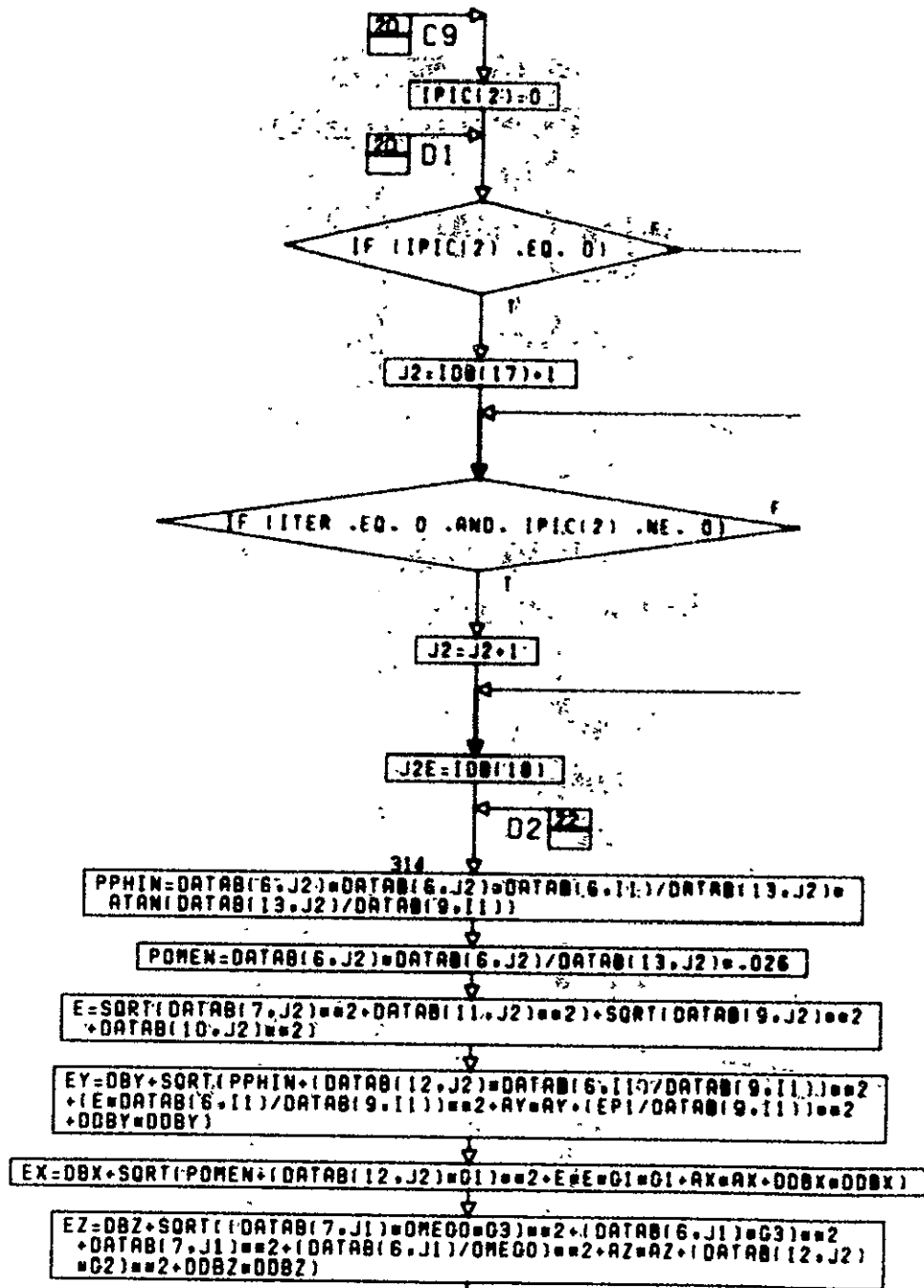


CONT. ON PG 20



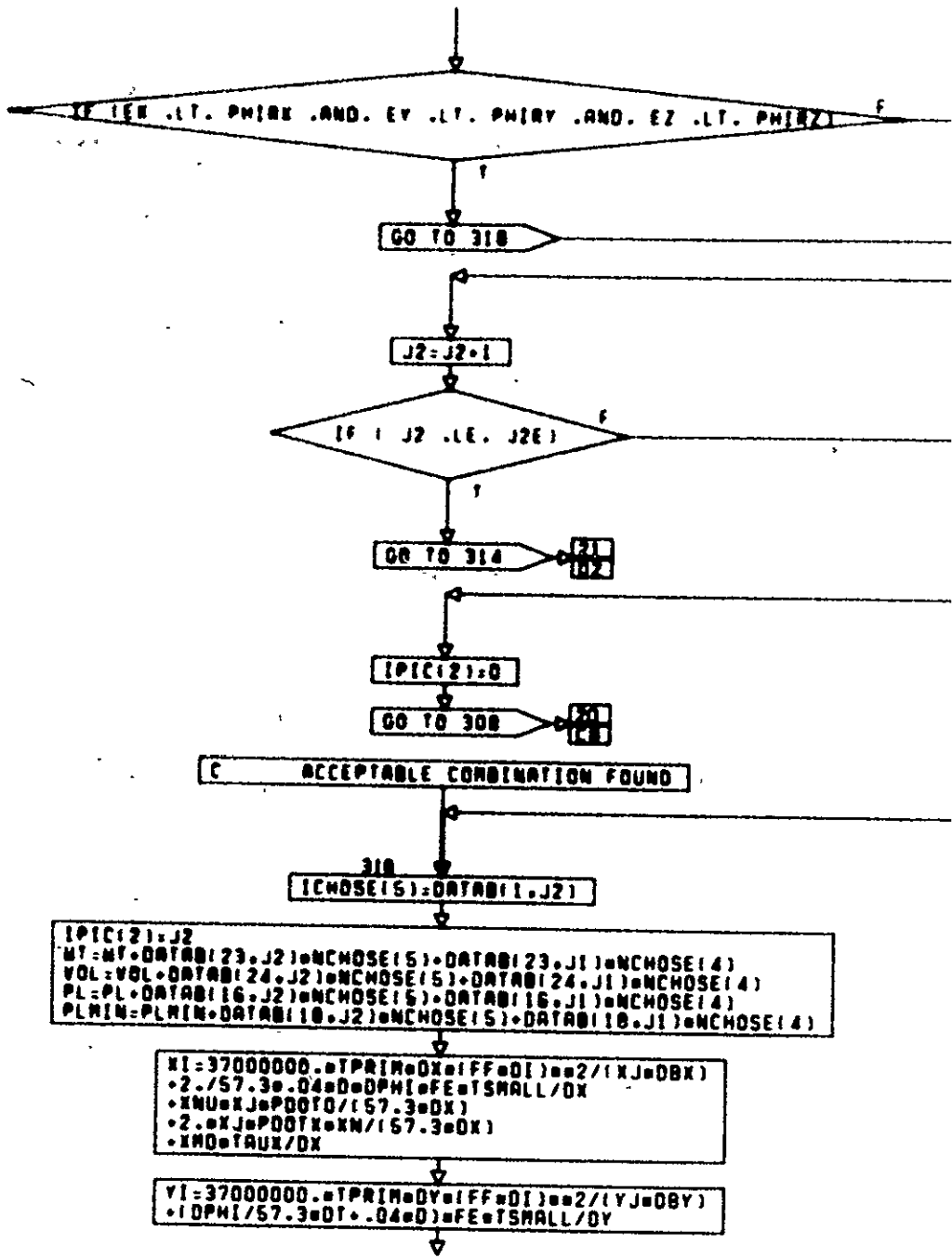
CONT. ON PG 21

PG 20E 37



CONT. ON PG 22

PG 2 OF 37



CONT. ON PG 23

PG 22E 37

```

* XNU=YJ*PDOT0/(57.3*DY)
* 2.*YJ*PDOTY*YV/(57.3*DY)
* YMD=TAUY/DY

```

```

Z1=37000000.*TPR(H*OZ*(FF*DI)*Z/(ZJ*OZ))
*(DPH/(57.3*OT*.04*O1)*FE*TSMALL/OZ)
* XNU=ZJ*PDOT0/(57.3*OZ)
* 2.*ZJ*PDOTZ*ZV/(57.3*OZ)
* ZMD=TAUZ/OZ

```

```

TI=XI+YI+ZI
FC=14.1E-9*FF*OX*DI/(XJ*.4*PH*RX)

```

RETURN

C CONFIGURATION 4

2 D3

400

IERR=D

```

QJ1=XJ*PDOTX/57.3
QJ2=YJ*PDOTY/57.3
QJ3=ZJ*PDOTZ/57.3
HMAN=AMAX1(QJ1,QJ2,QJ3)
TMD=AMAX1(XMD2,YMD2,ZMD2)
HREQ=HMAN*.06400.*TL*TMD
TREQ=HMAN/TACCEL*TMD

```

C TEST IF ONLY 3-AXIS WHEELS OKAY

```

PDOTM=AMAX1(PDOTX,PDOTY,PDOTZ)
PDOTR=AMIN1(PDOTRX,PDOTRY,PDOTRZ)

```

IF (TREQ/HREQ .GE. .02 .AND. .0000033\*PDOTM .LT. PDOTR)

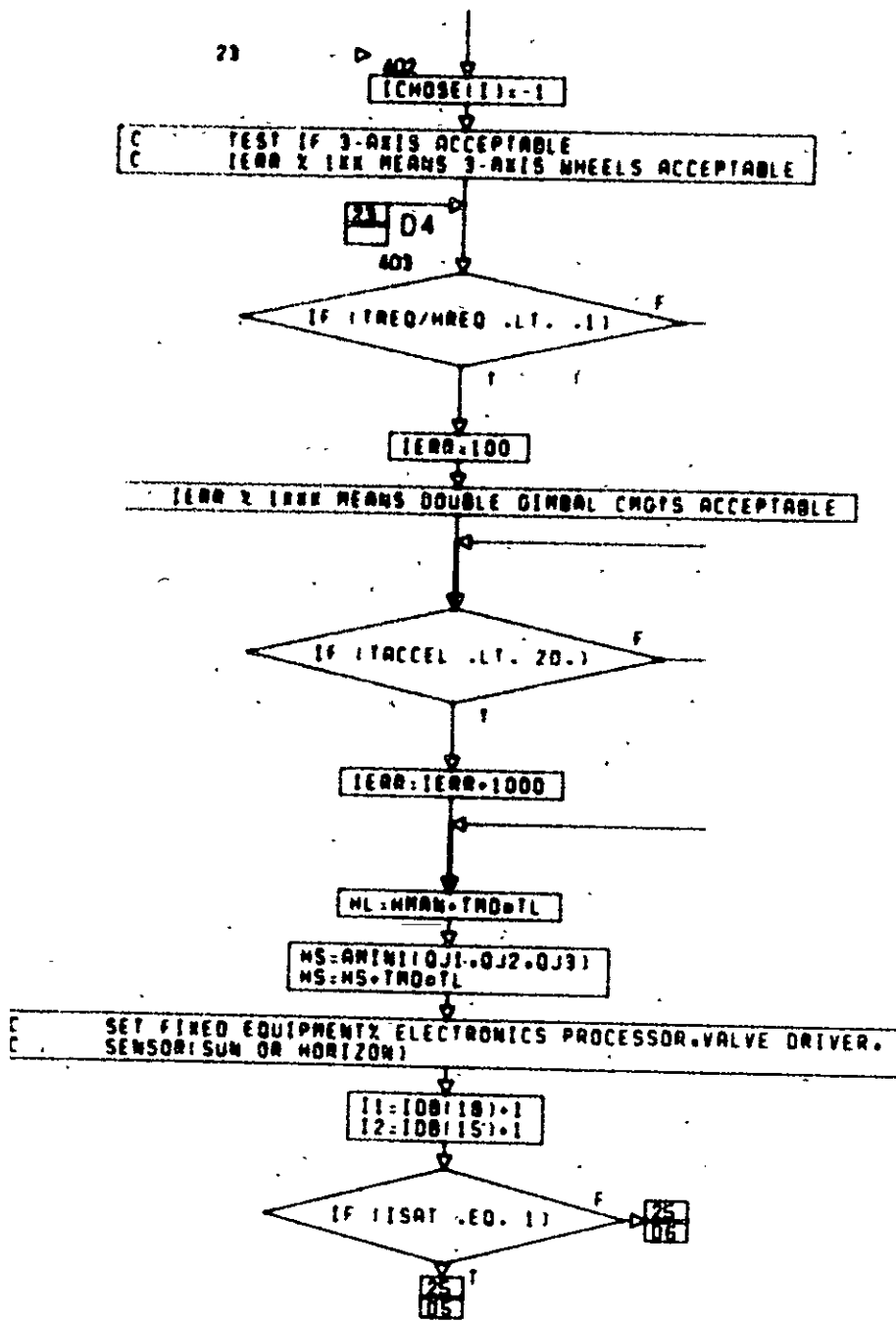
GO TO 403

24  
04

DO 402 I=1,9

CONT. ON PG 24

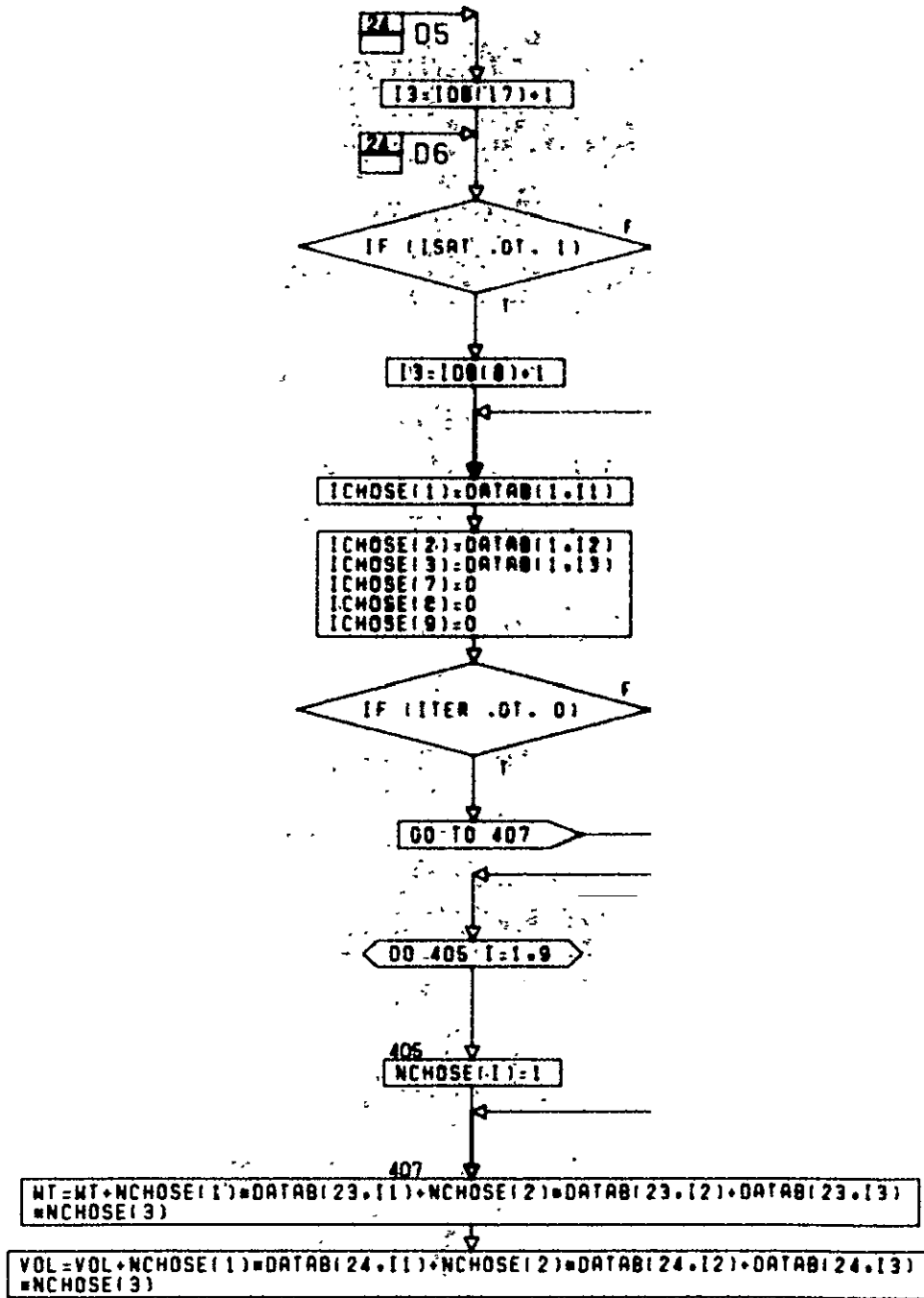
PG 20F 37



CONT. ON PG 25

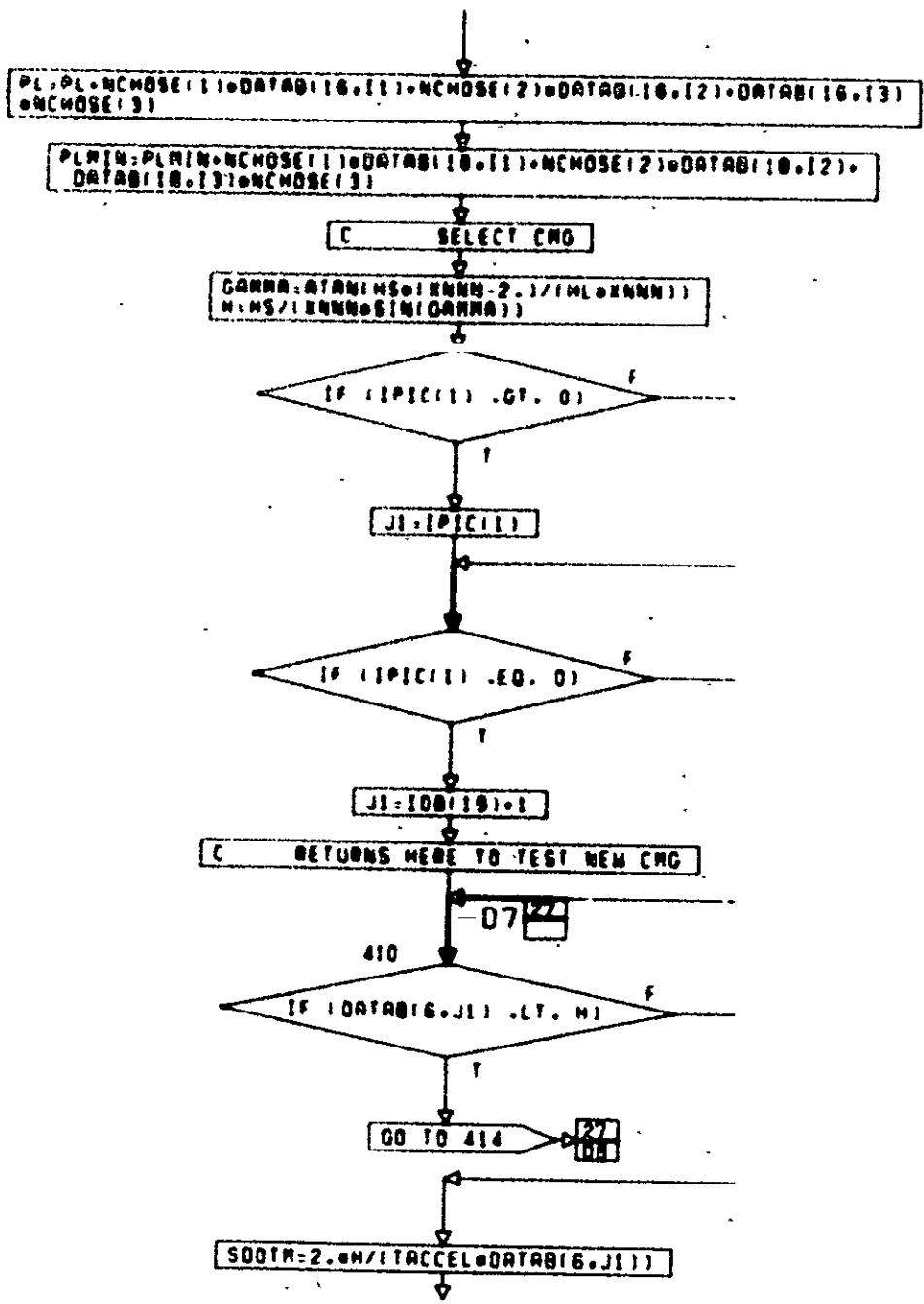
PG 24 OF 37



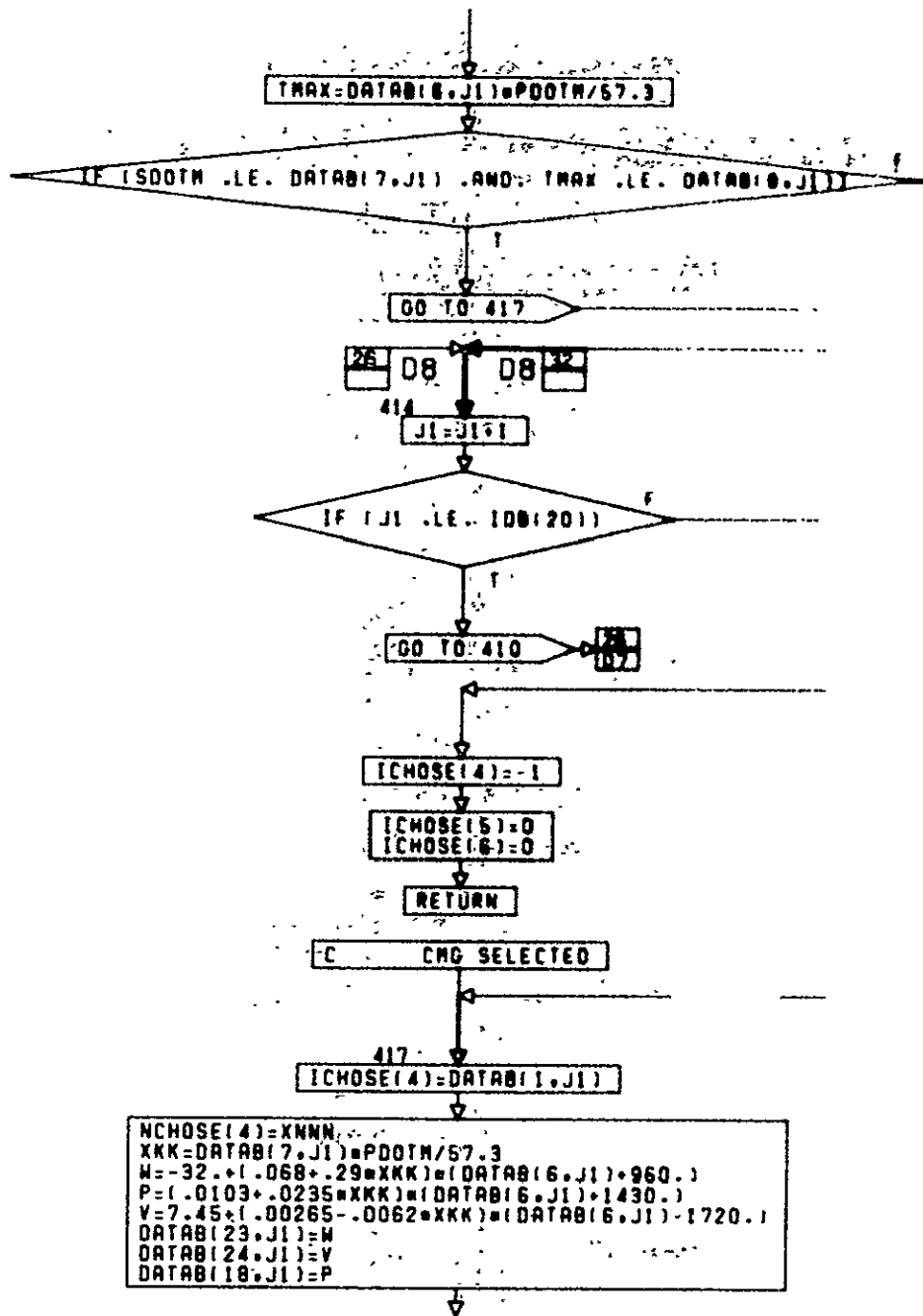


CONT. ON PG 26

PG 25F 37

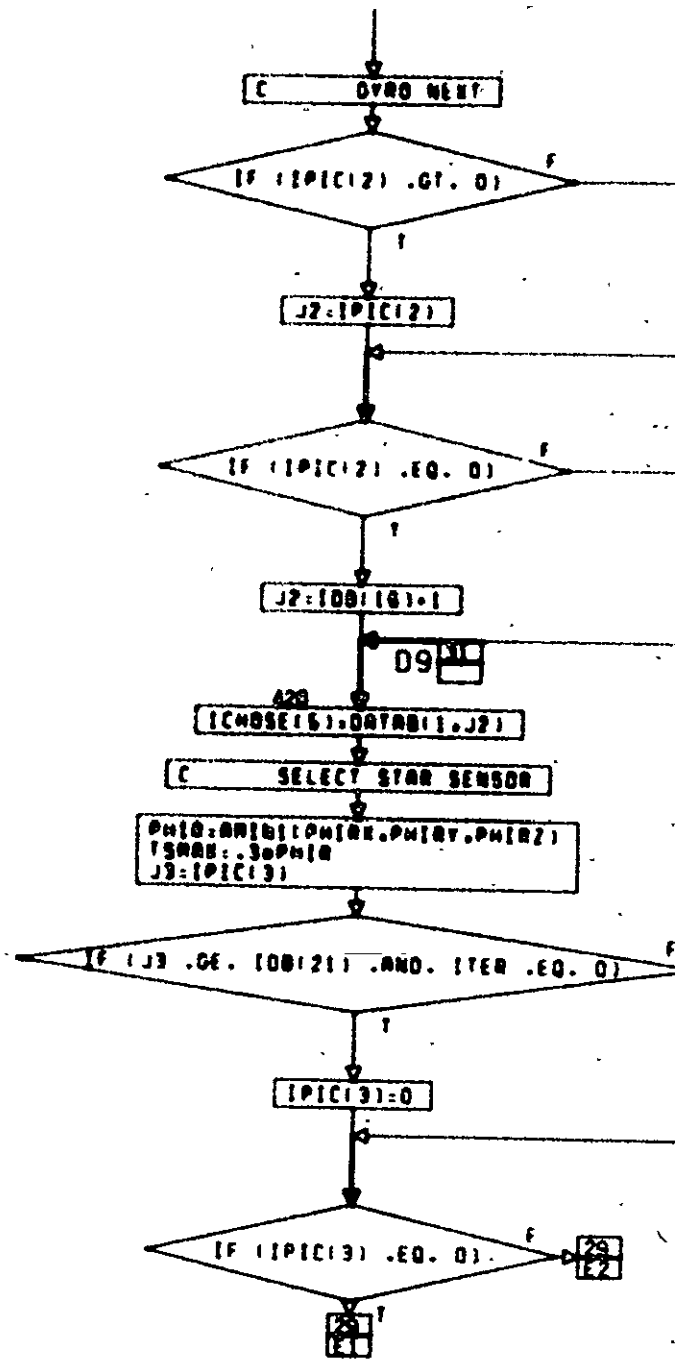


CONT. ON PG 27



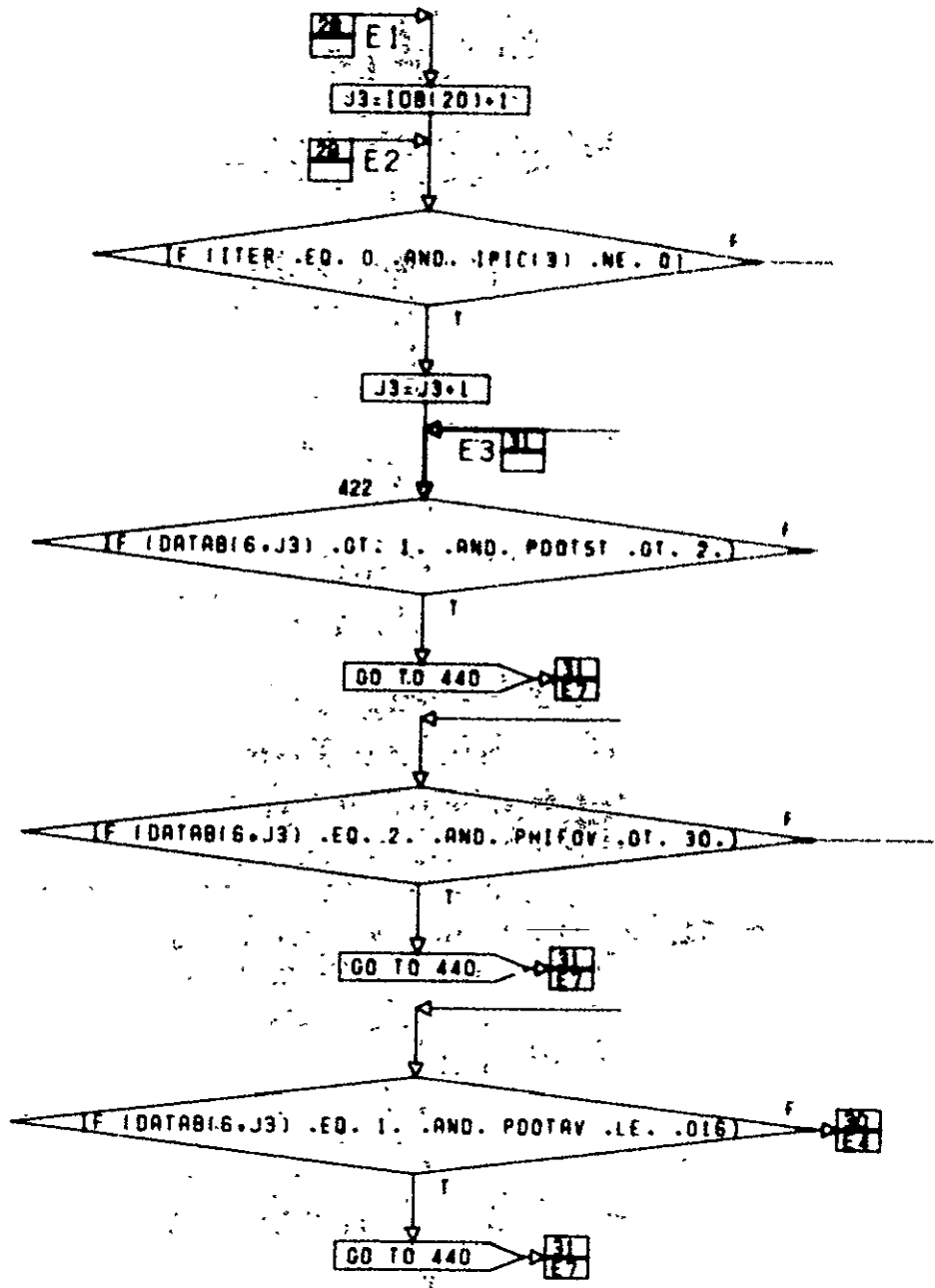
CONT. ON PG 28

PG 27E 37



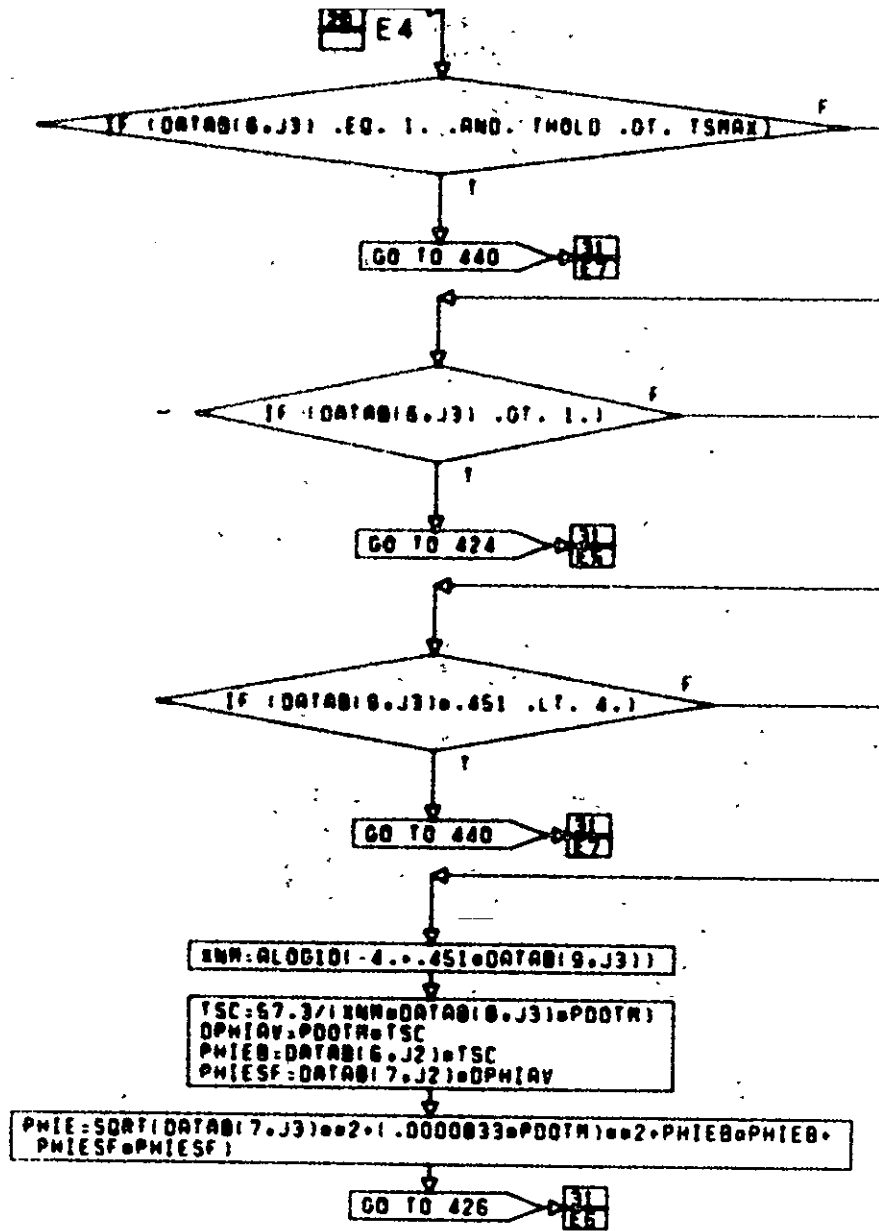
CONT. ON PG 29

PG 200F 37



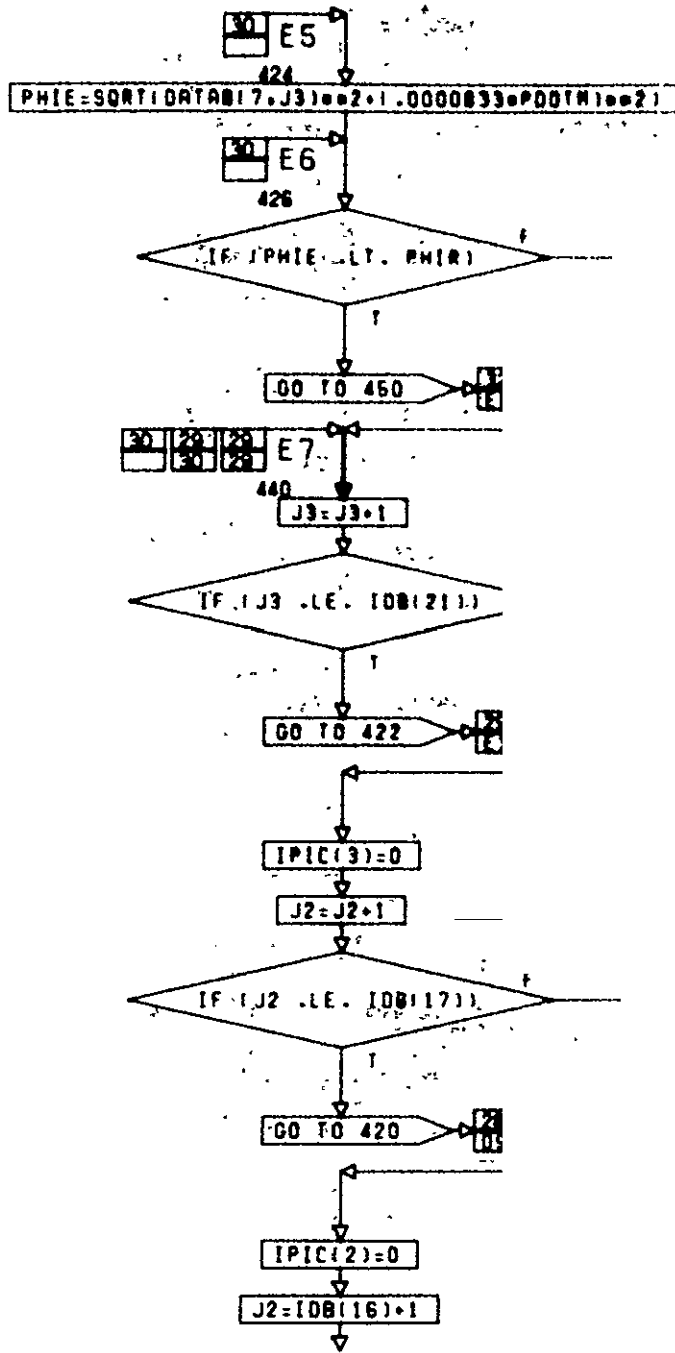
CONT. ON PG 30

PG 28F 37



CONT. ON PG 31

PG 30F 37



CONT. ON PG<sup>2</sup> 32

PG 30F 37

GO TO 414

ACCEPTABLE COMBINATION FOUND

E8

ICHOSE(6):DATA(1,J3)

IPIC(1):J1  
IPIC(2):J2  
IPIC(3):J3  
MT=M7\*NOENNN\*NCMOSE(5)DATA(23,J2)\*NCMOSE(6)DATA(23,J3)  
VOL=V0L\*VOZNNN\*NCMOSE(5)DATA(24,J2)\*NCMOSE(6)DATA(24,J3)  
PL=PL\*PONNNN\*NCMOSE(5)DATA(16,J2)\*NCMOSE(6)DATA(16,J3)

PLIN=PLIN\*DATA(10,J1)\*NNNN\*NCMOSE(5)DATA(10,J2)\*NCMOSE(6)DATA(10,J3)

NON TRUST AND IMPULSE

F(1):IDPM(OT/57.3\*.040D)FE/DV  
F(2):IDPM(OT/57.3\*.040D)FE/DZ  
F(3):2./57.3\*.040DOPM(OF/DH  
FF:ARRN(F(1),F(2),F(3))

F(=(F(1)+F(2)+F(3))001  
\*MMUOP00T0/57.3\*HJ/DH\*VJ/DV\*ZJ/DZ)  
\*TPRIN#2502000.01\*HND/DH\*YND/DV\*ZND/DZ)

FC.FF0DH001/1RJe.40PMIRN)014.1E-9

RETURN

CONFIGURATION 5  
SELECT FIXED EQUIPMENT

E9

I1=I00(15):1

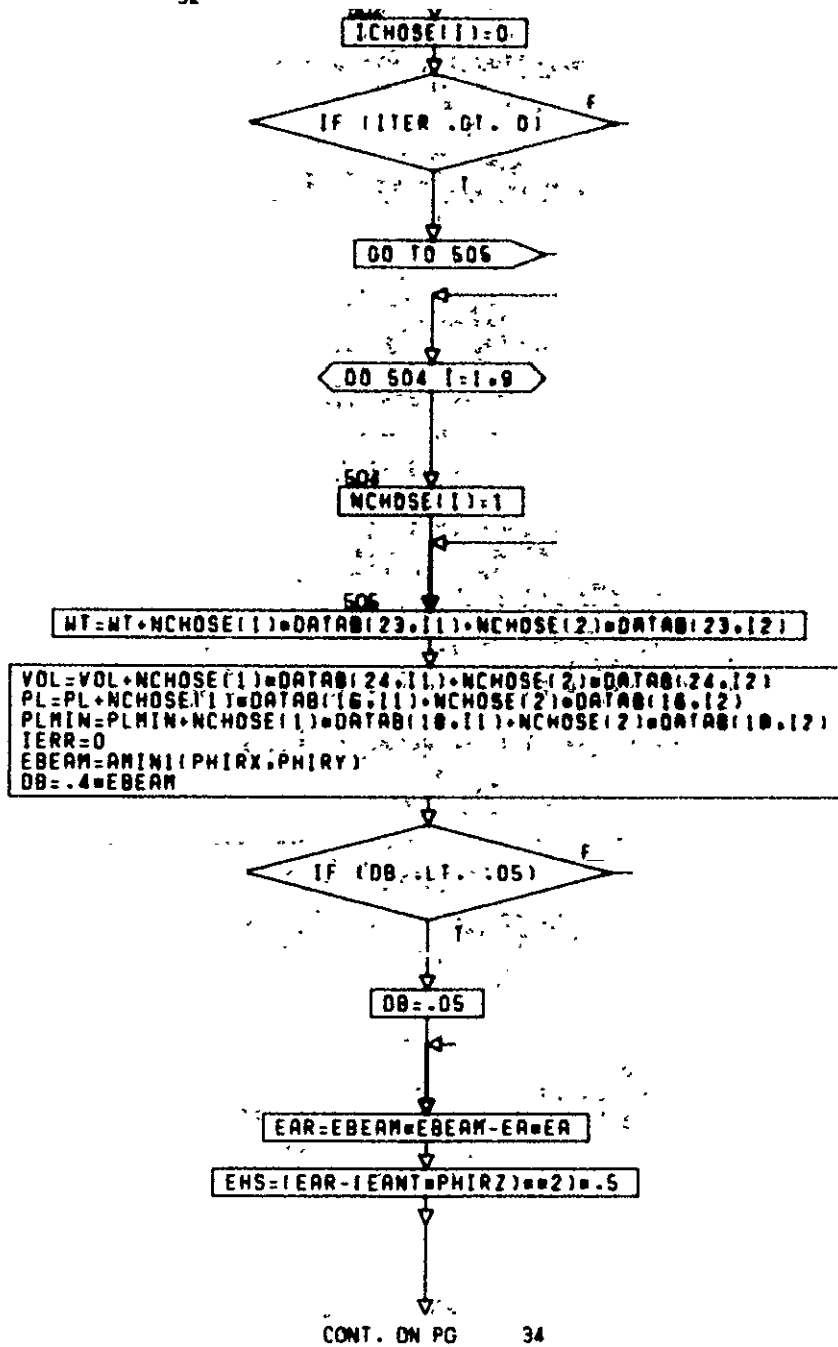
I2=I00(21):1  
ICHOSE(1):DATA(1,I1)  
ICHOSE(2):DATA(1,I2)  
OMEG0=1.1064\*10.000/124.053\*1000.\*1000.\*6076.\*ALF)001.5

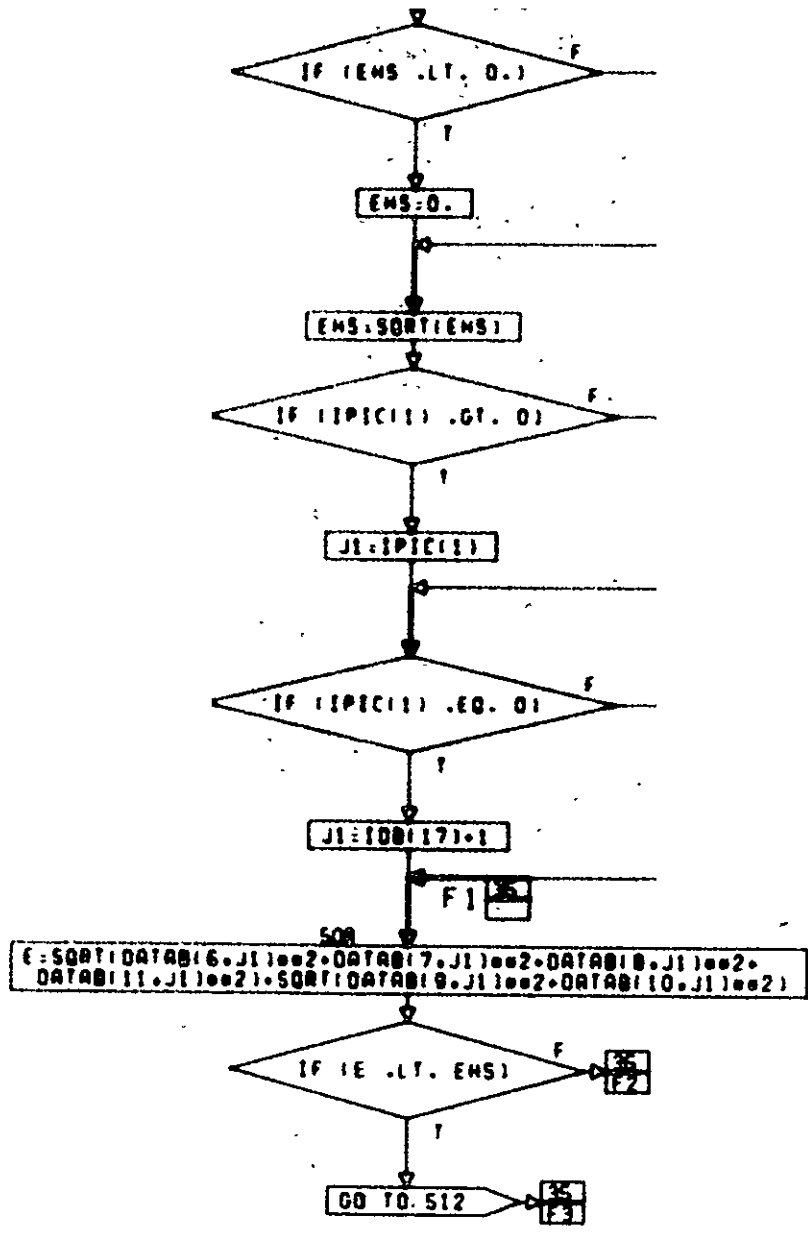
DO 502 I=5,9

CONT. ON PG 33

PG 32F 37

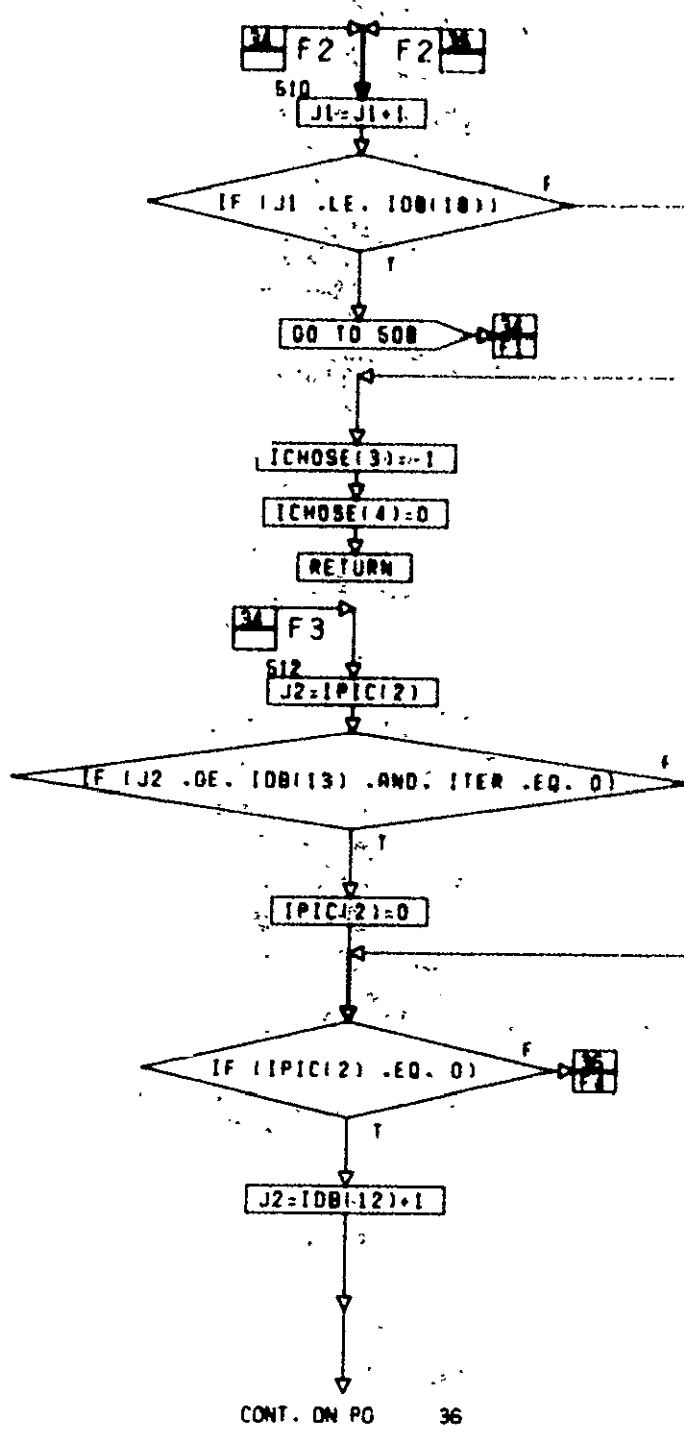




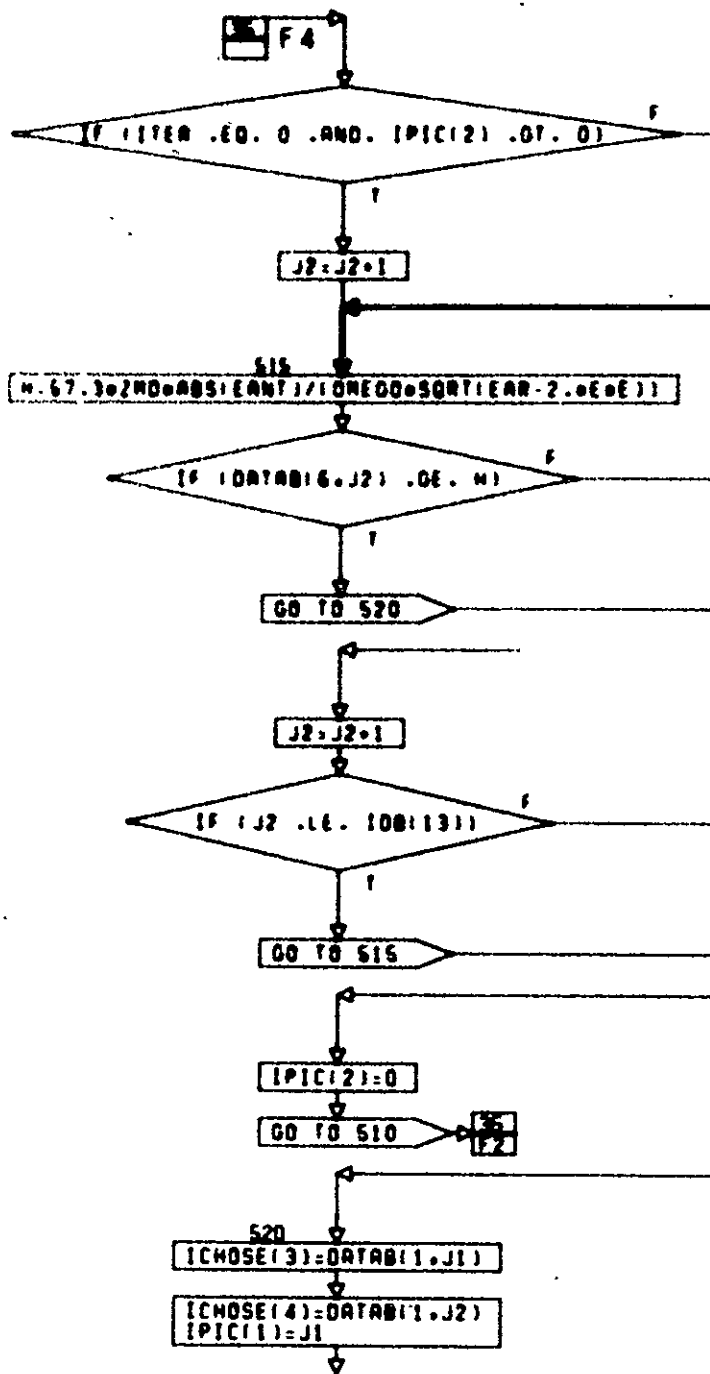


CONT. ON PG 35

PG 34E 37



PG 35F



CONT. ON PG 37

PG 340F 37

```

IPIC(2)=J2
IPIC(3)=0
MT=MT+NCHOSE(3)*DATA(23,J1)+NCHOSE(4)*DATA(23,J2)
VOL=VOL+NCHOSE(3)*DATA(24,J1)+NCHOSE(4)*DATA(24,J2)
PL=PL+NCHOSE(3)*DATA(16,J1)+NCHOSE(4)*DATA(16,J2)
PLMIN=PLMIN+NCHOSE(3)*DATA(10,J1)+NCHOSE(4)*DATA(10,J2)

```

```

DX=.5*D=COS(ALPHA)
FMAX=DB*DATA(16,J2)*SORT(XJ/ZJ)/(D*DK)
DZ=.5*D=SIN(ALPHA)
DY=.5*D
F(1)=(OPHI/57.3*DT+.04*D)*FE/DY
F(2)=(OPHI/57.3*DT+.04*D)*FE/DZ
F(3)=2./57.3*.04*D*OPHI*FE/DK
FMIN=AMAX(F(1),F(2),F(3))

```

```
FF=2.*FMIN
```

```
IF (FF .LT. FMIN)
```

```
FF=FMIN
```

```

TI=(F(1)+F(2)+F(3))*DI*
XNU=PDOTD/57.3*(XJ/DX+YJ/DY+ZJ/DZ)*
37.E6*TPRIM=(FF*DI)**2*.5*(DX/(XJ*PHI*RX)+DY/(YJ*PHI*RY))
+XND*TAUX/DX+YND*TAUY/DY

```

```
FC=14.(E-9*FF*DX*DI/(XJ*.4*PHI*RX))
```

```
RETURN
```

```
END
```

ORIGINAL PAGE IS  
OF POOR QUALITY

SUBROUTINE STRUCT(NCONF)  
DIMENSION NCONF(6)  
COMMON/USER6/CA,CE

COMMON /BTM/ MT,VOL,DT,SATDAM,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLAIN  
.LMDD,AREA,SATLO,SOARMT,NC,ACSNP,HARMT,INCMNT,CONVMT,INMT,PASST  
.SATTMT,TPRIH,IBTLOC,RADA,RADAB,RAT,HTPRNR,PTPRNR,  
HPT,HTPIPE,VCHP,HTPT,FC,XNZERO,CONRT,ACSSN,BITRAT(2),  
EOBLG,SABOLO,SATNT

COMMON /USER6/EOPF,HB12SM,EOM1XL,EOM1YL,EOM1ZL,EOM2XL,EOM2YL,  
EOM2ZL,ISBOFG,NUMEEQ,EEOMT(9),EEQVL(9),EM1YCG,EM1ZCG,EM2YCG,  
EM2ZCG,CDEEX(9),FELOC(9),XCOSA1,XCOSA3

COMMON /PRTCM/ACCRCY,CISTAR,IREL,MMOOLD,TRUNC,ITRUNC,DE,TE,  
TOOLR,OCR,SEIR,PMR,PE,PU,TOOLU,DCP,SEIP,PNP,SATR,SATINV,NER,  
REINV,PAYR,PAYINV,PAYOUL,GSE,XLTOT,CTOT,FEER,FEIINV,ODIE,RVEST,  
OPS,SKTAU(6),ROLD(6D),T,AM,TS,BS,AM,TF,DF,TC,TA,TB,TOTOPS

DATA E,XNU,SIGY,P(1,E7,.33,3,E4,3,1,116/  
TB= 0,  
XXNU= 1. - XNU\*\*2  
ICHECK= 1

IF (NCONF(5).EQ.1.OR.NCONF(5).EQ.3.OR.NCONF(5).EQ.5).AND.  
XCOSA1.EQ.-2)

ICHECK= 2

C ICHECK= 2 MEANS THAT SOLAR ARRAYS ARE PADDLES AND MOUNTED AT  
C CENTER OF VEHICLE. ICHECK= 1 MEANS OTHERWISE.

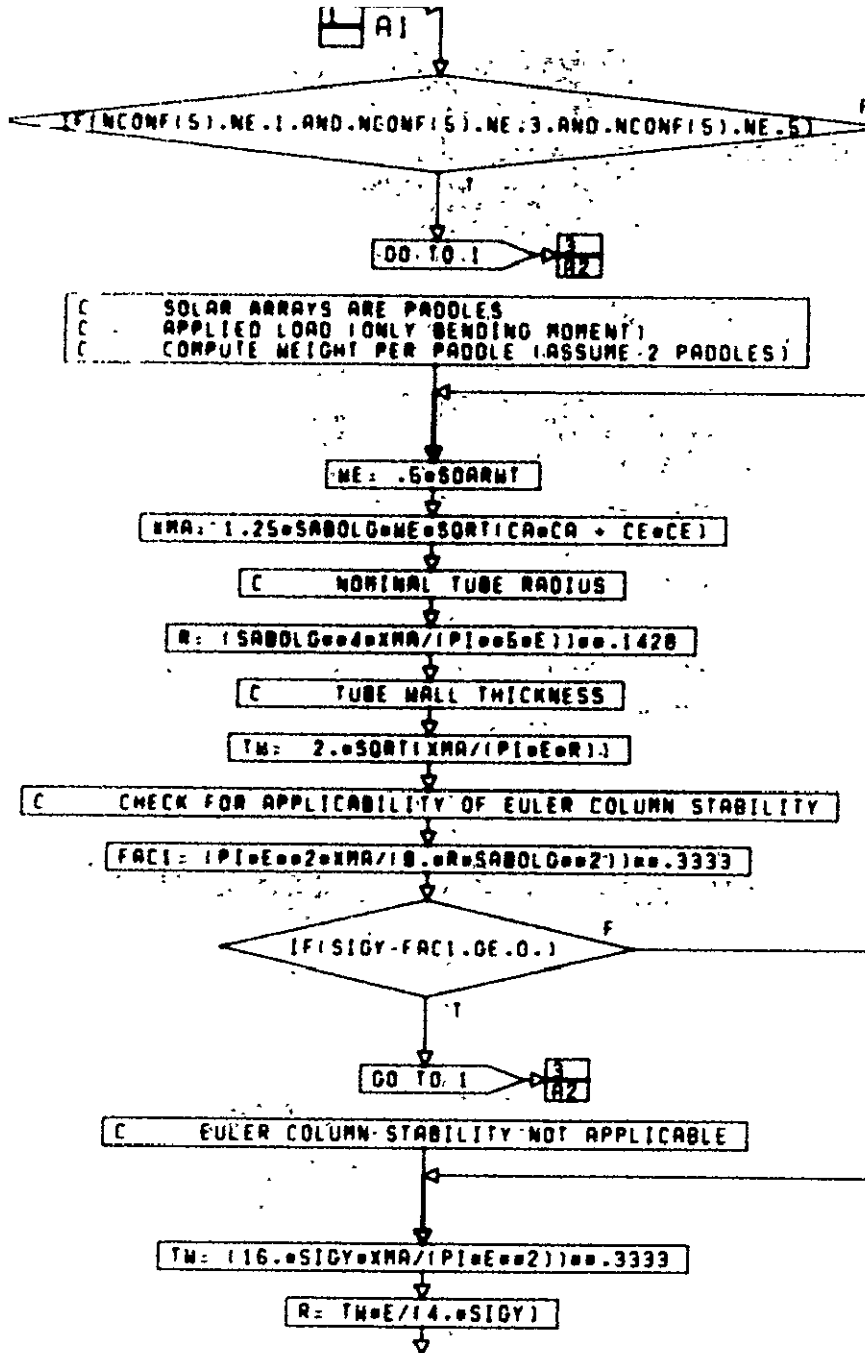
XL= EOBLG

IF (ICHECK.EQ.-2)

XL= .5\*EOBLG

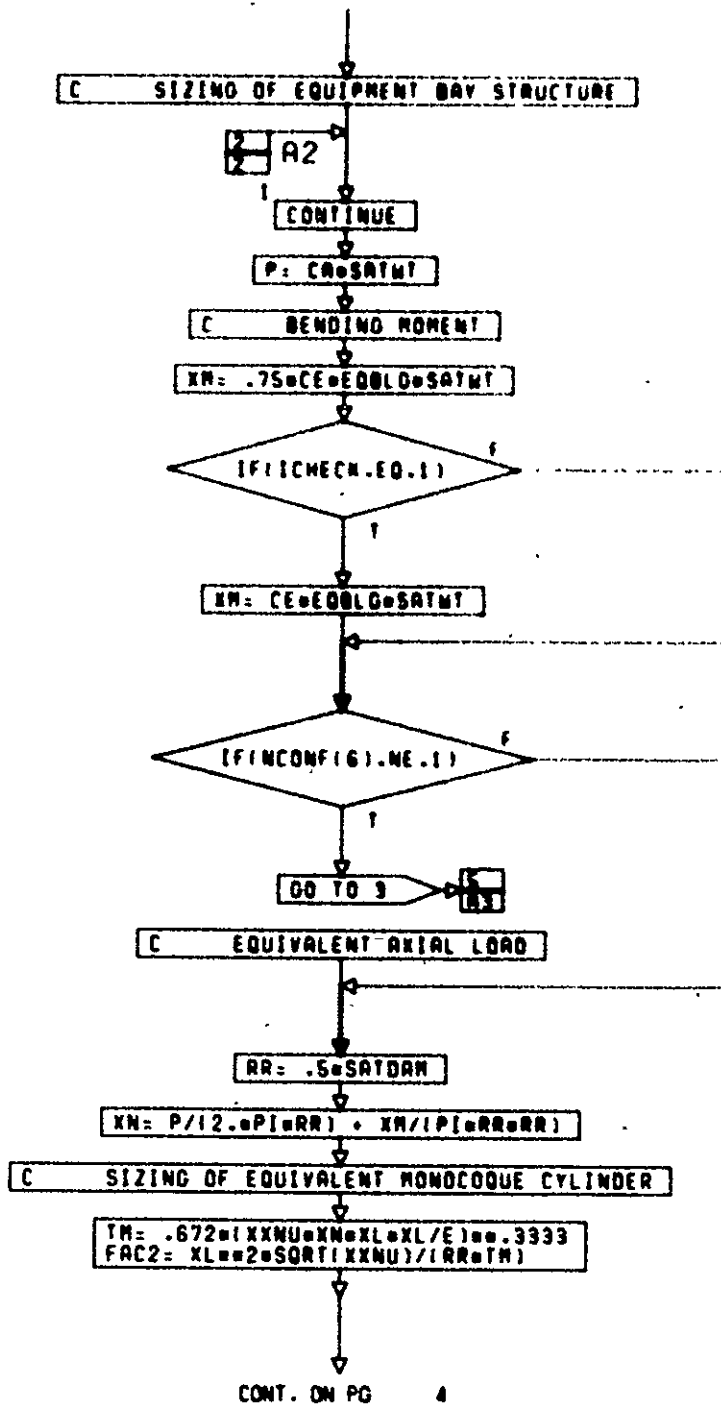
CONT. ON PG

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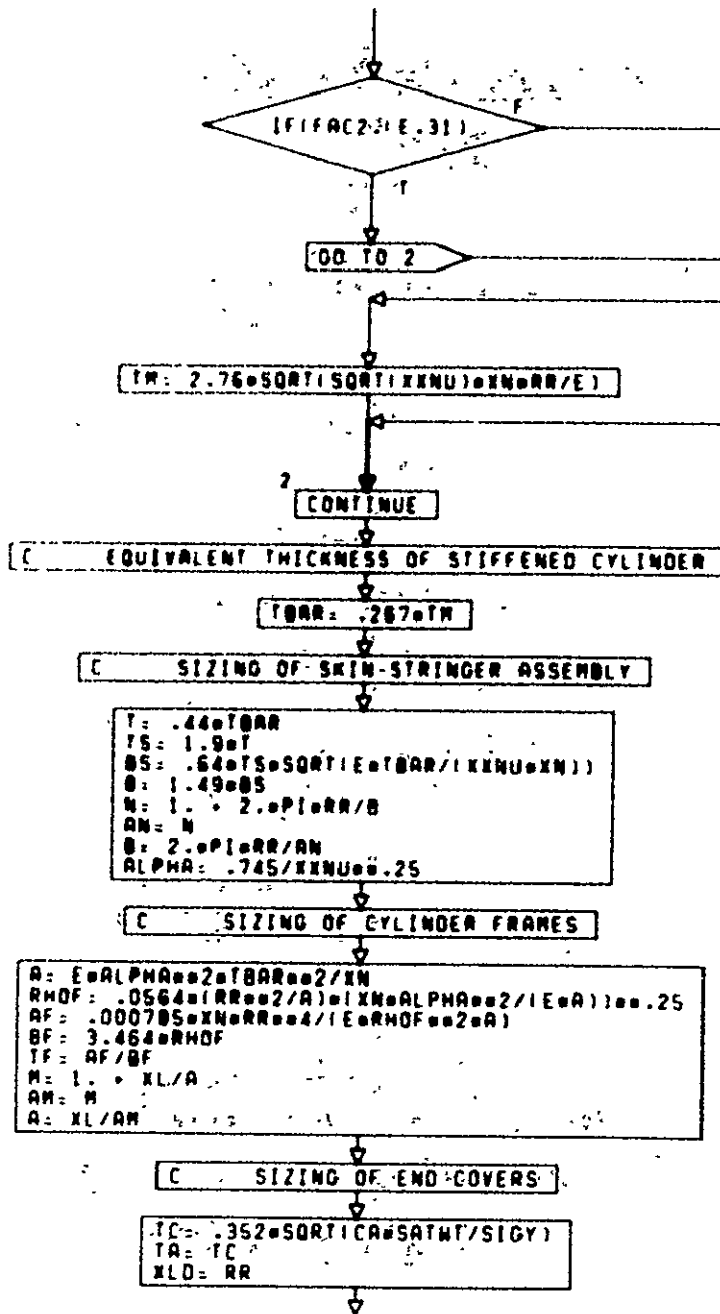


CONT. ON PG 3

PG 2 OF

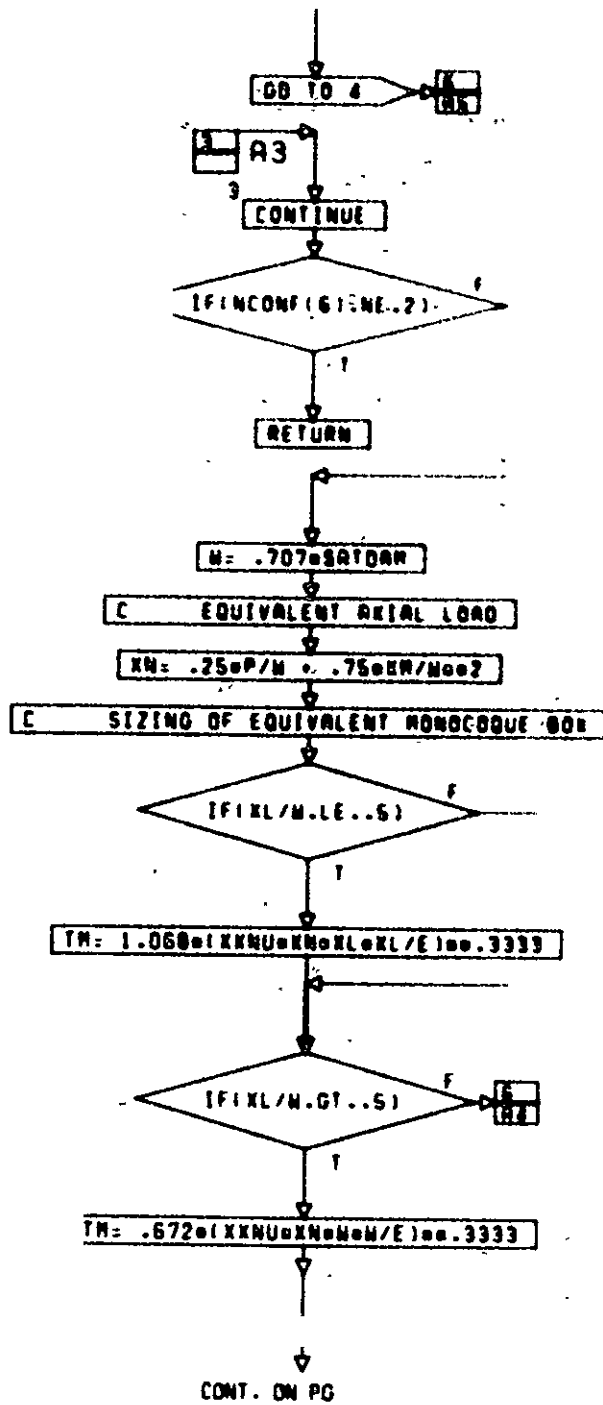




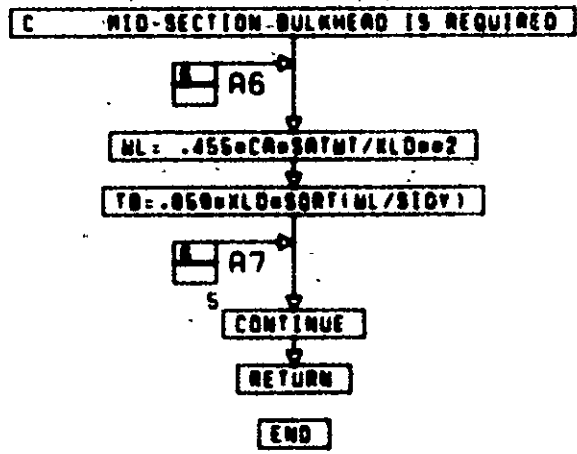


CONT. ON PG 5

PG 4 OF







PG 7 FINAL

SUBROUTINE VESIZE(ITER,NCONF,ICHOSE)

DIMENSION NCONF(6),EES(10),EEYCO(9),EEZCO(9),EENK(9),EENY(9),  
EENZ(9),EEXCO(9)

COMMON /USER6/EOPF,M0125H,EOM1XL,EOM1YL,EOM1ZL,EOM2XL,EOM2YL,  
EOM2ZL,ISBDFG,NUMEQ,EEOMT(9),EEQVL(9),EM1YCO,EM1ZCO,EM2YCO,  
EM2ZCO,CGEEX(9),EELOC(9),XCOSA1,XCOSA9

COMMON /USER1/EOM1WT,EOM2WT,DIAMAX,ALT

COMMON /BTM/STINWT,SATVOL,DT,SATDAM,DX,DY,DZ,SATINX,SATINY,  
SATINZ,RJ,FF,TI,PL,PLMIN,LWDD,SOAREA,SATLO,SOARNT,NC,ACSWP,  
HARNWT,THCMT,CONVMT,TNKMT,PASST,SATTMT,IPRIN,IBLOC,  
RADA,RADAB,RAT,HTPWR,HTPRB,HPT,HTPIPE,VCHP,HPT,  
FC,XNZERO,COMRT,ACSSN,BITRAT(2),EQDLO,SABOLO,SATWT

ISHAPE = NCONF(6)  
ISPIN = 0  
RLD = .617

{(NCONF(1).EQ.1.OR.NCONF(1).EQ.2)}

ISPIN = 1

IEOTYP = 1

{(NCONF(5).EQ.1.OR.NCONF(5).EQ.3.OR.NCONF(5).EQ.5)}

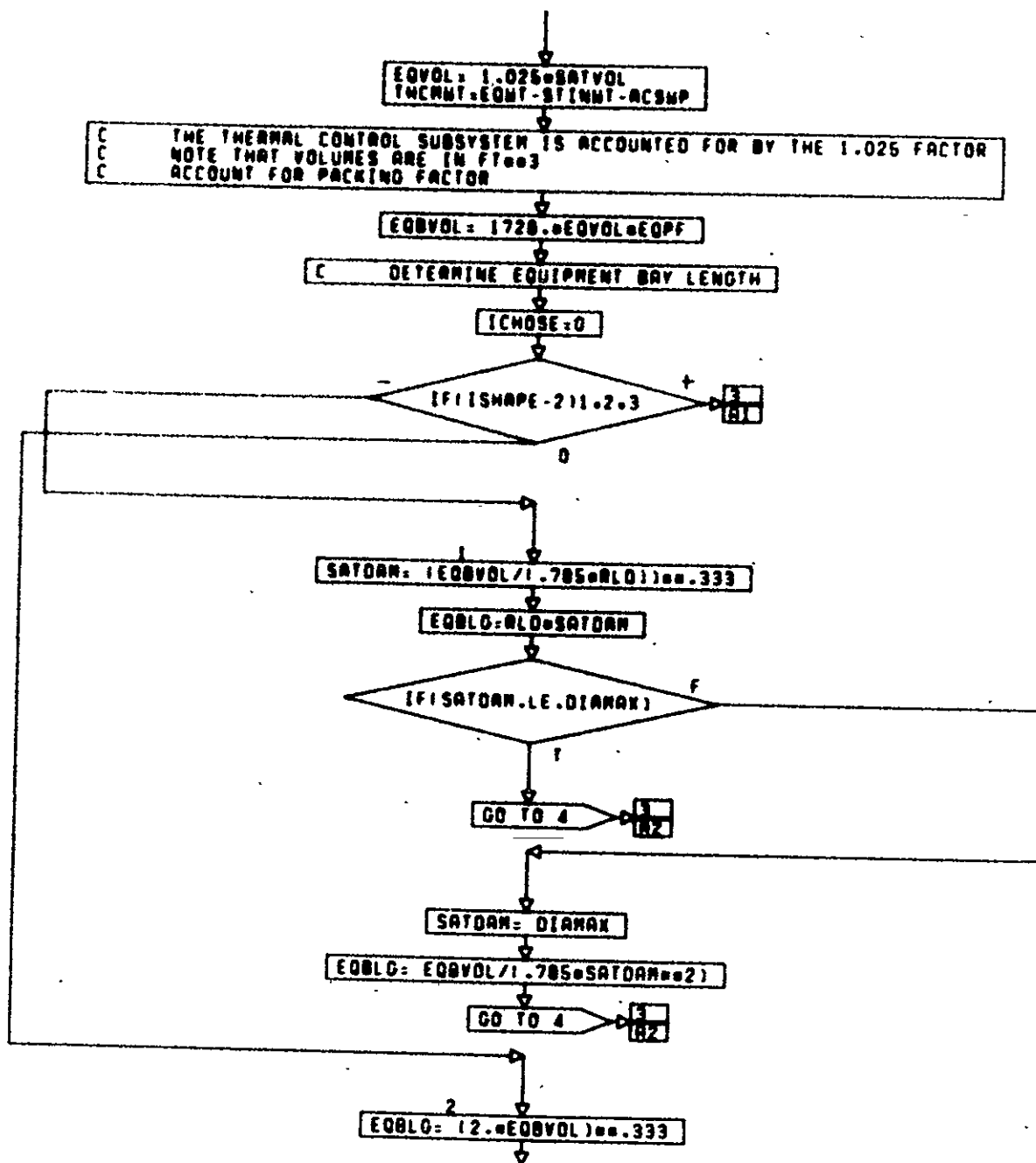
IEOTYP = 2

C DETERMINE EQUIPMENT BAY EQUIPMENT WEIGHT AND VOLUME

EQWT = 1.025\*(STINWT+ACSWP)

CONT. ON PG 2

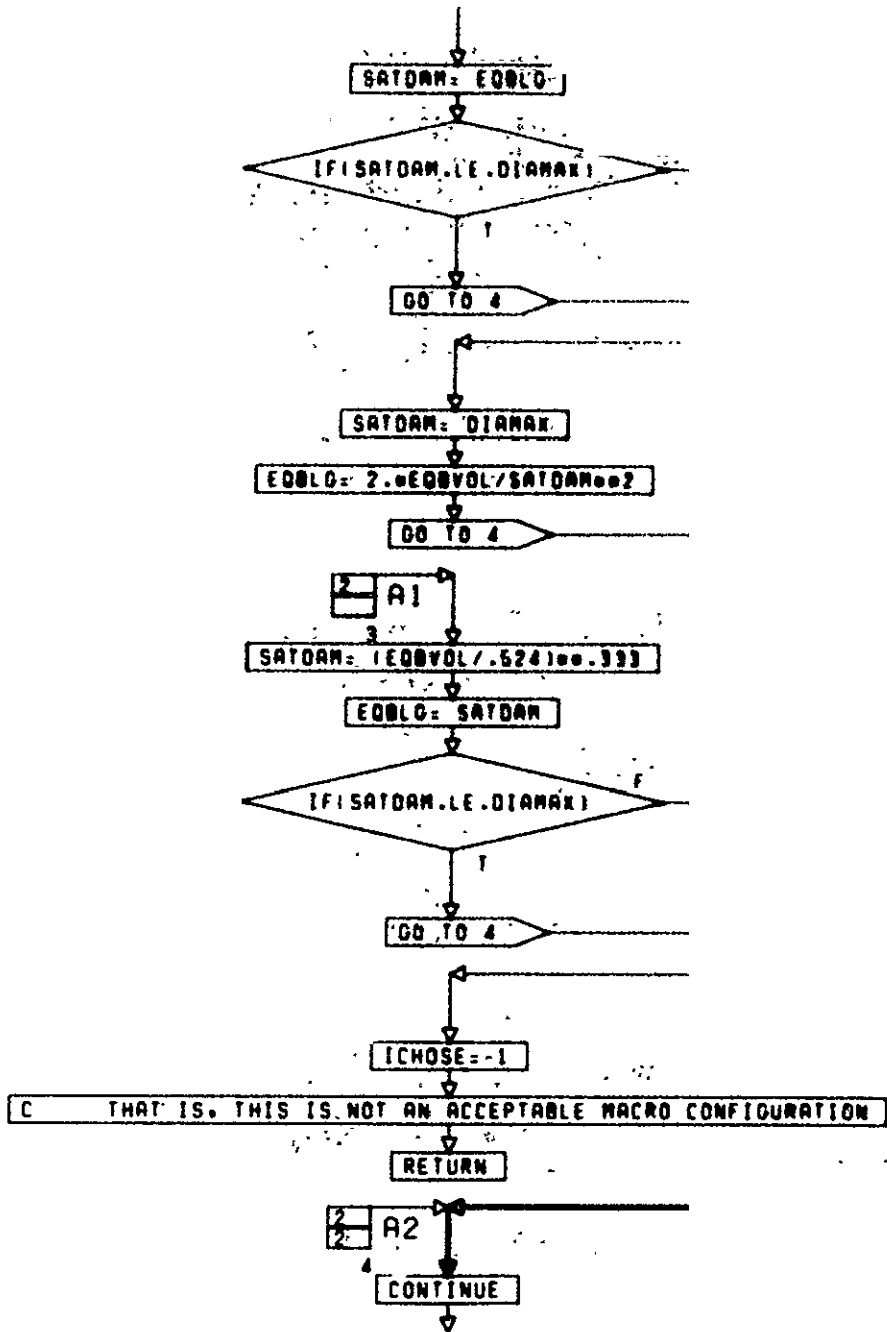
PG 1 OF 26



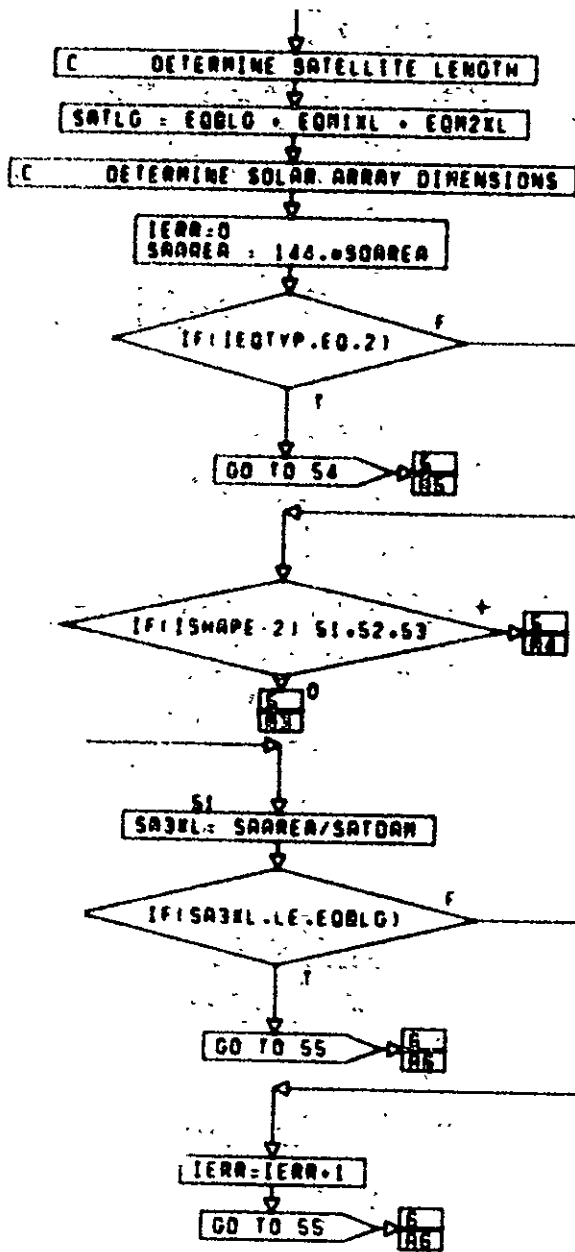
CONT. ON PG 3

PG 2 OF 26

C. 4

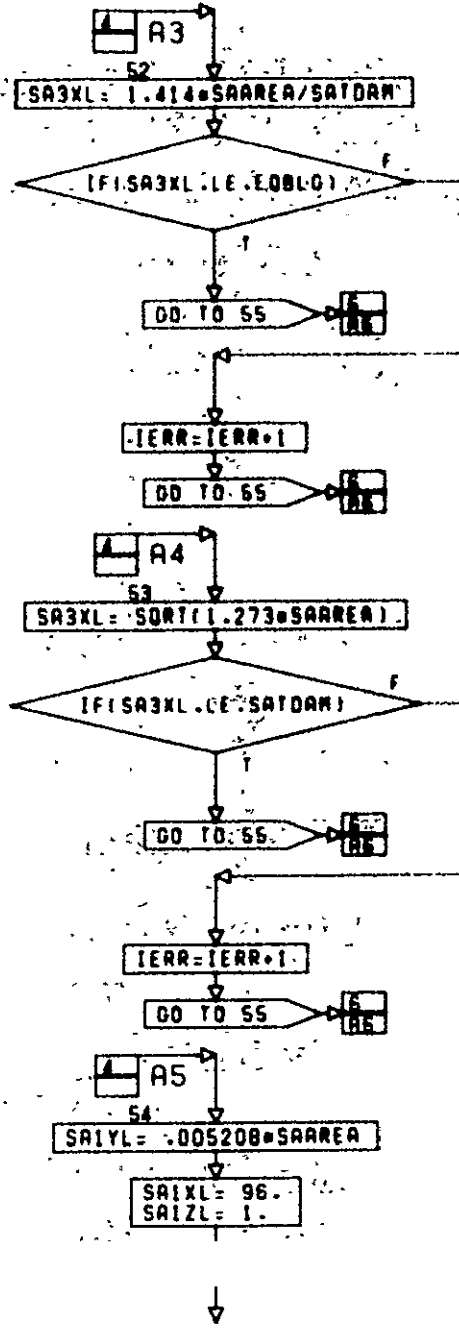


CONT. ON PG



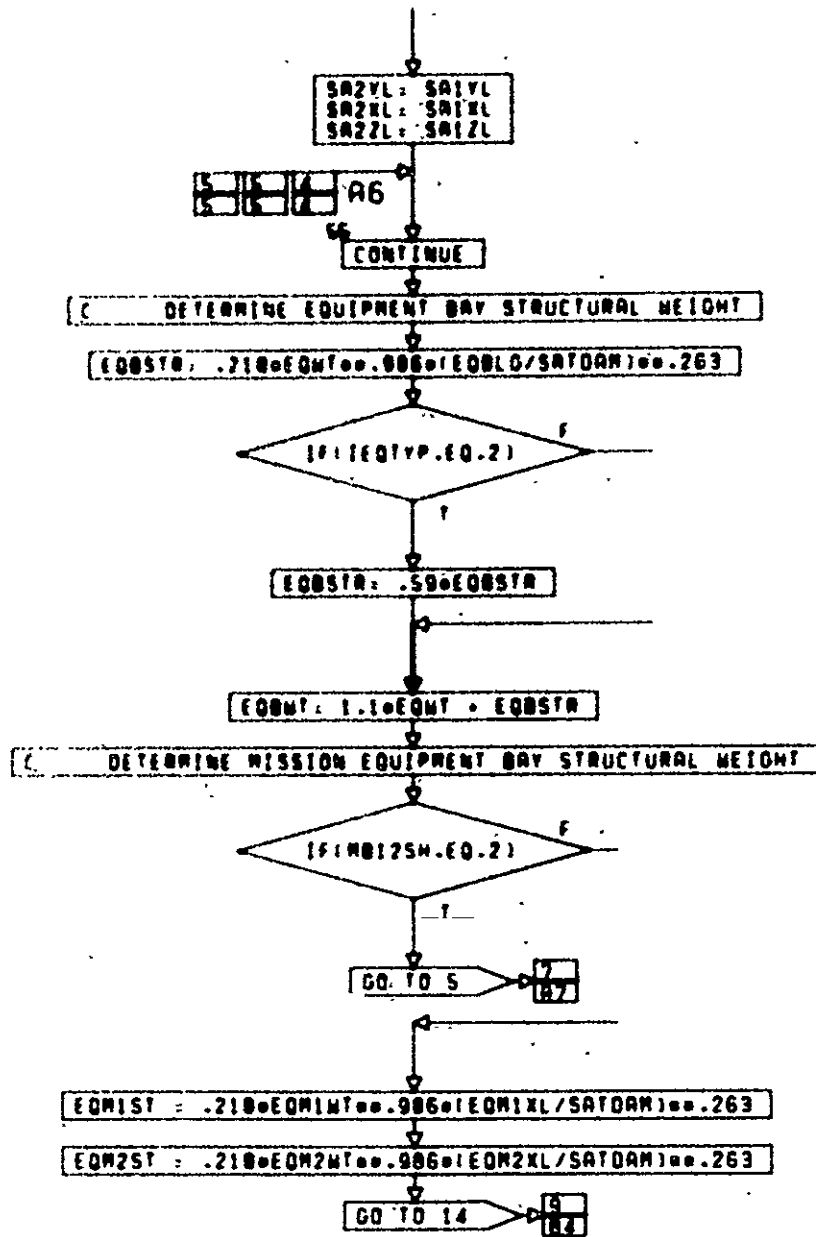
CONT. ON PG 5





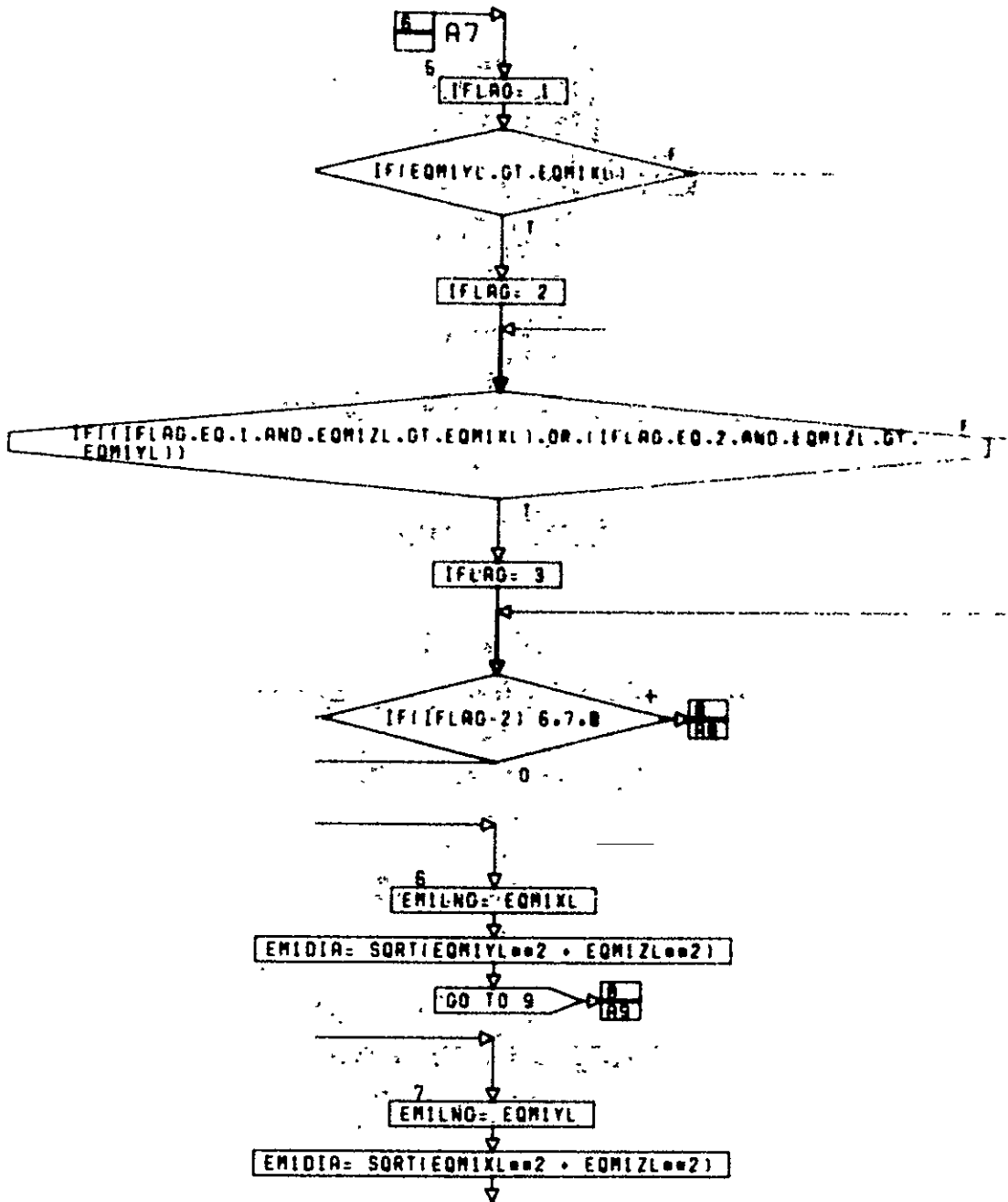
CONT. ON PG: 6

PG 5 OF 26



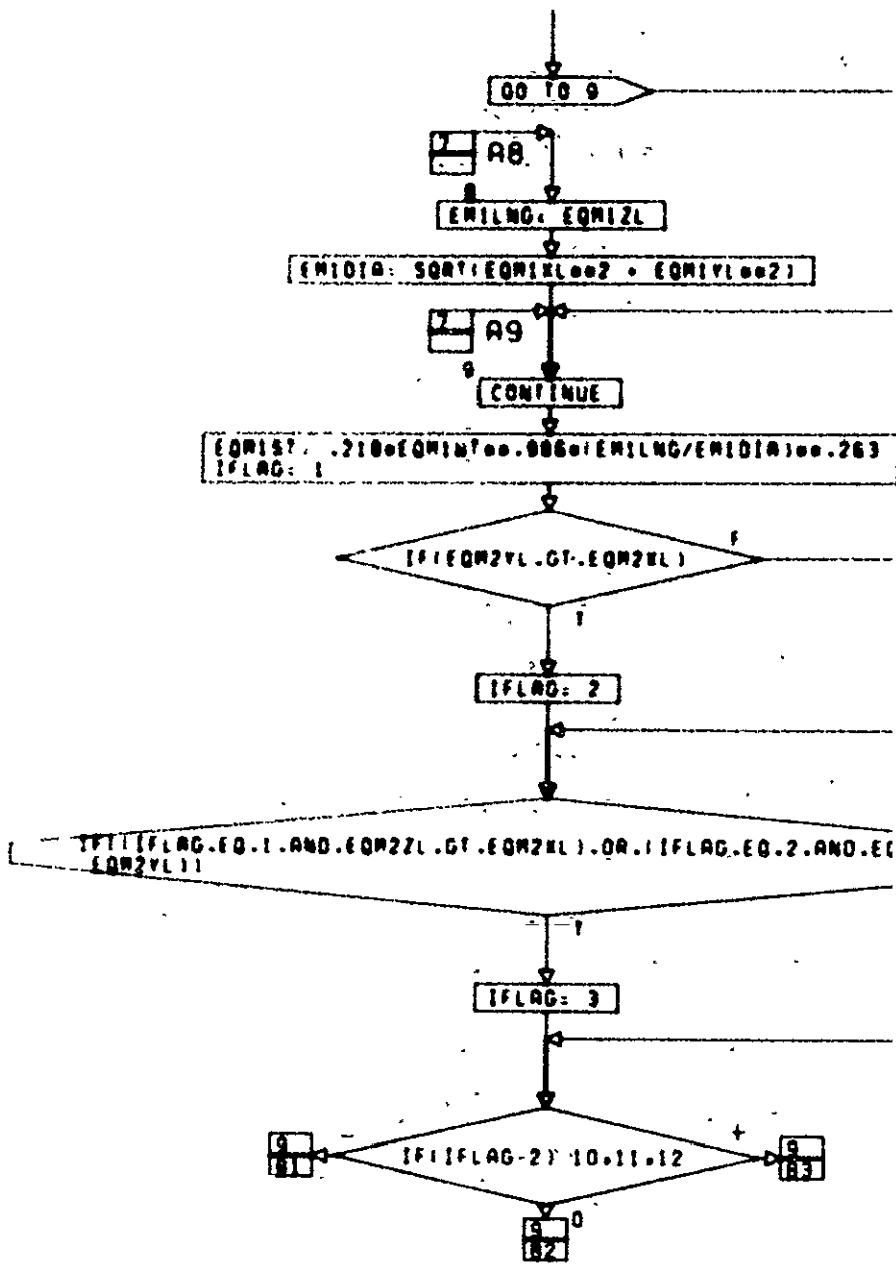
CONT. ON PG. 7

PG 6 OF 26



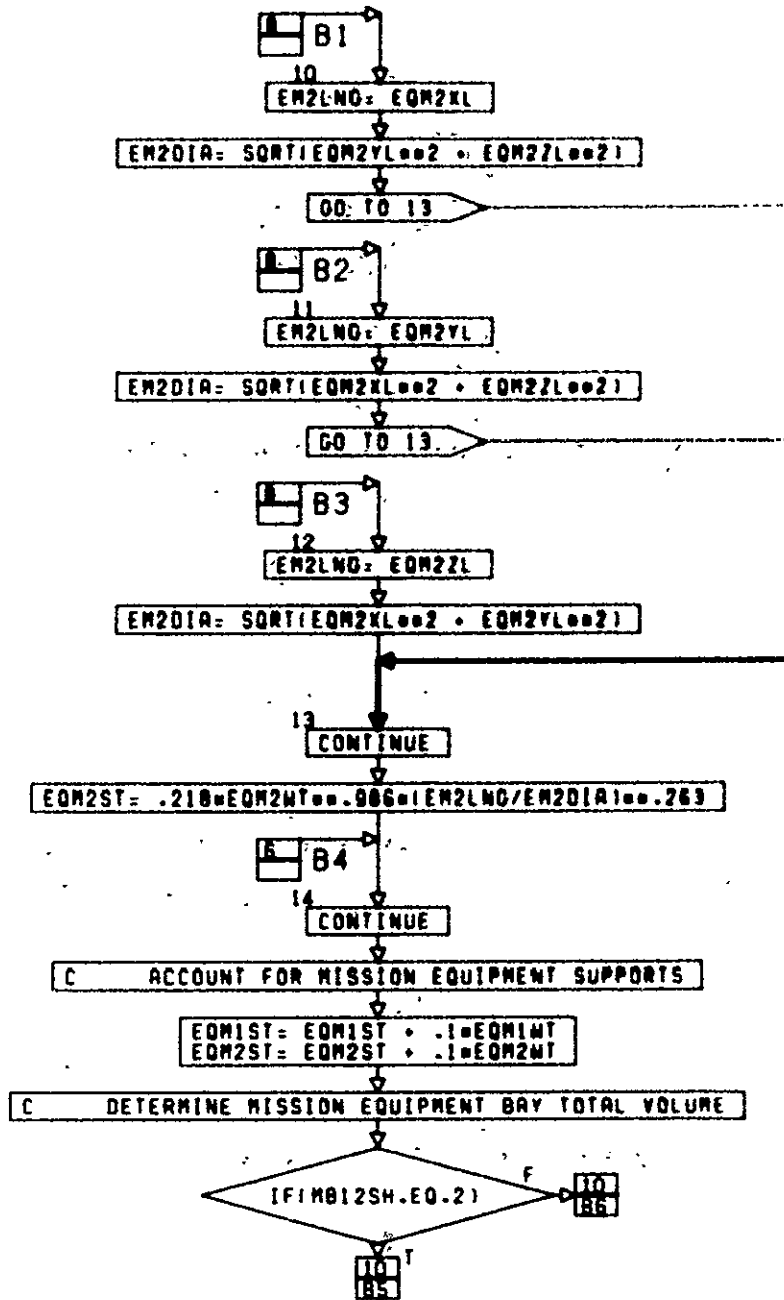
CONT. DN PG 8

PG 7 OF 26



CONT. ON PG 9

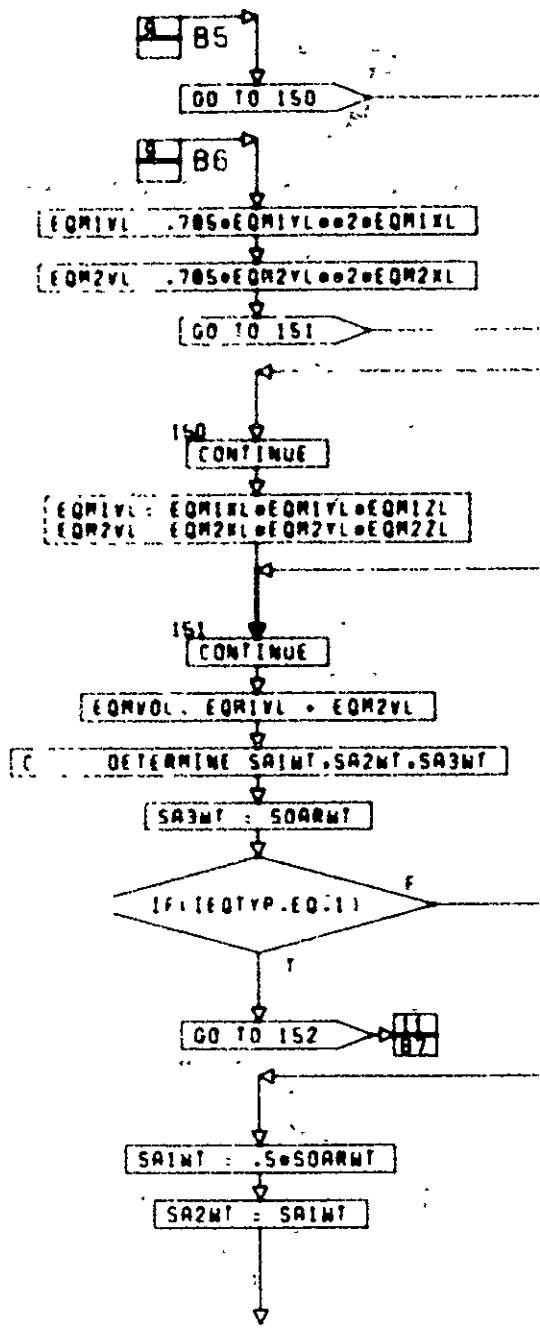
PG 8 OF 26



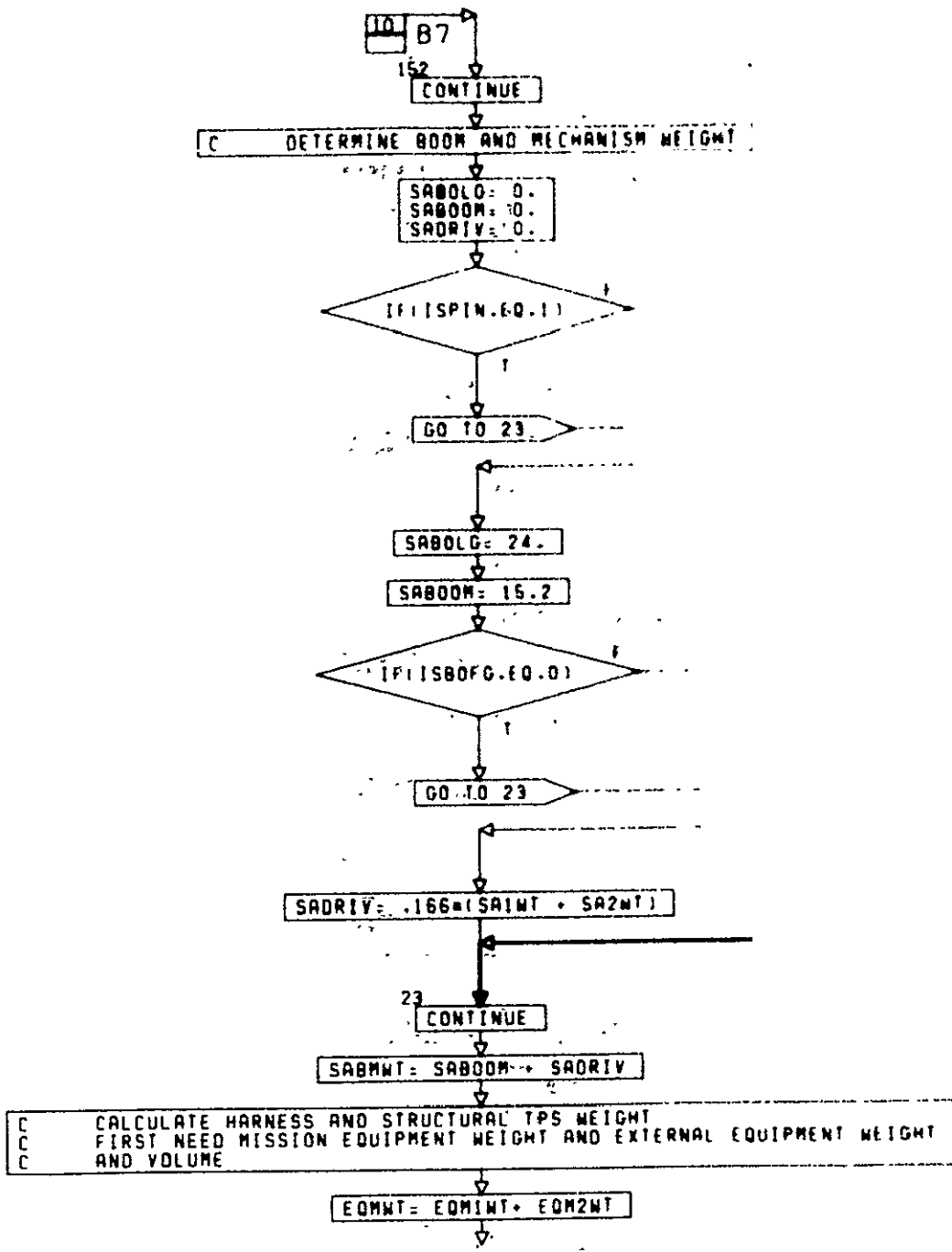
CONT. ON PG 10

PG 9 OF 26

118



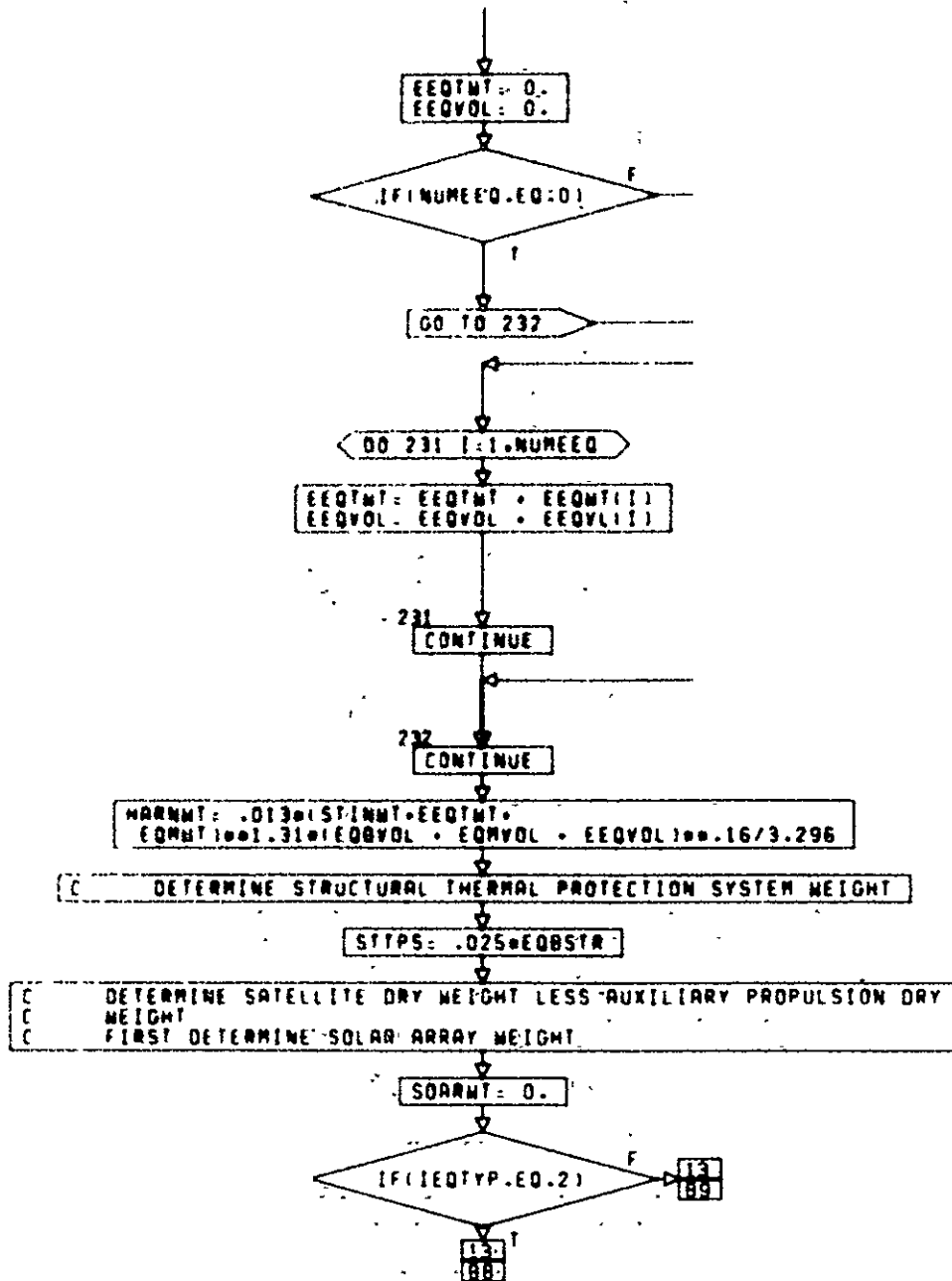
CONT. ON PG



CONT. ON PG 12

PG 1 OF 26

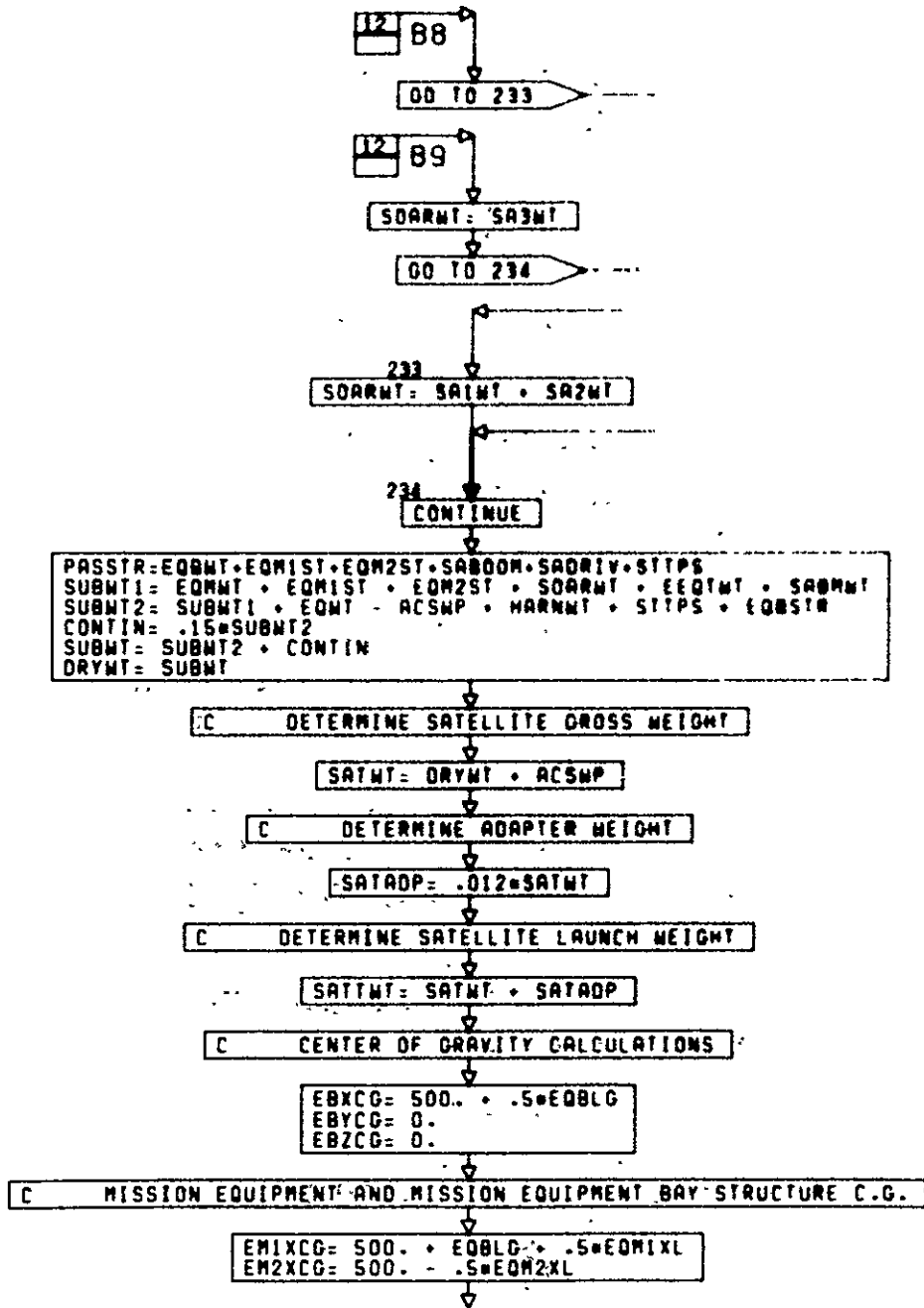
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CONT. ON PG 13

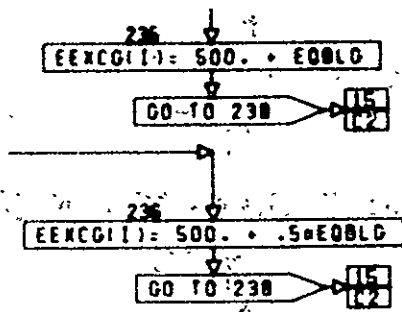
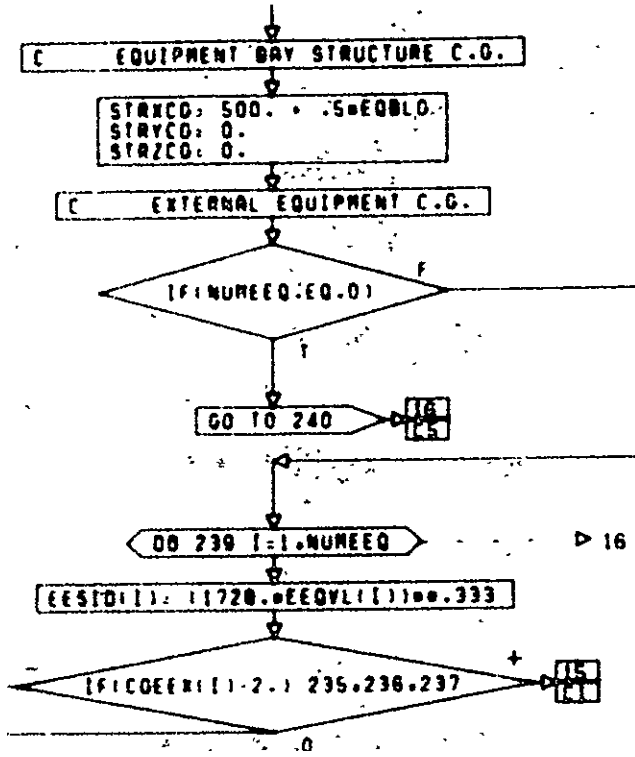
PG 12E 26





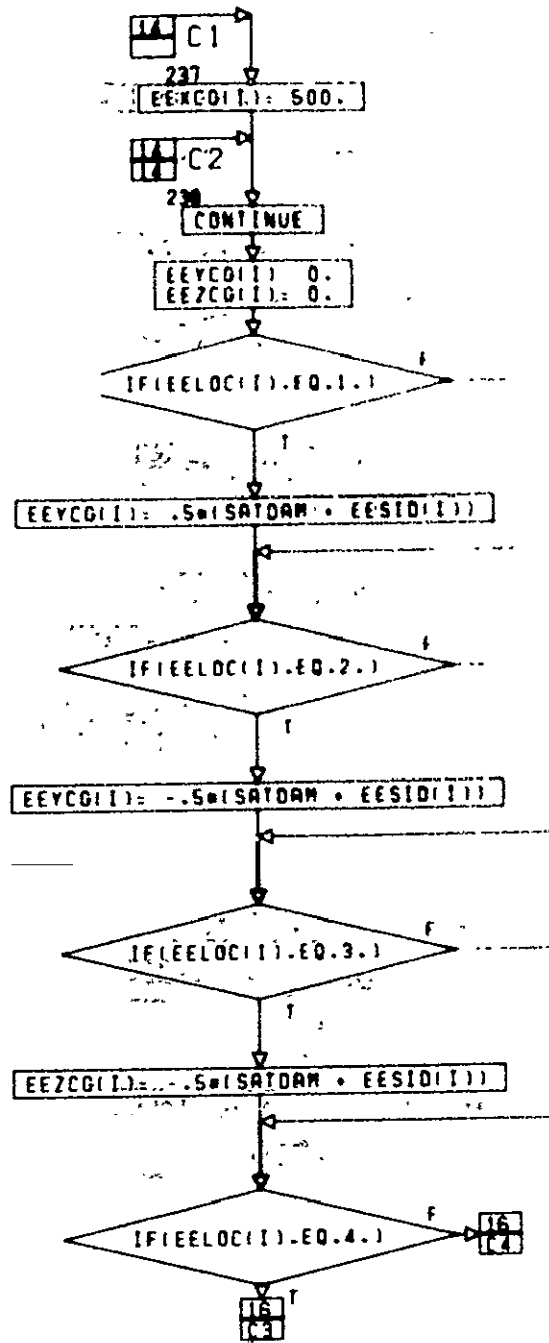
CONT. ON PG 14

PG 1 OF 26

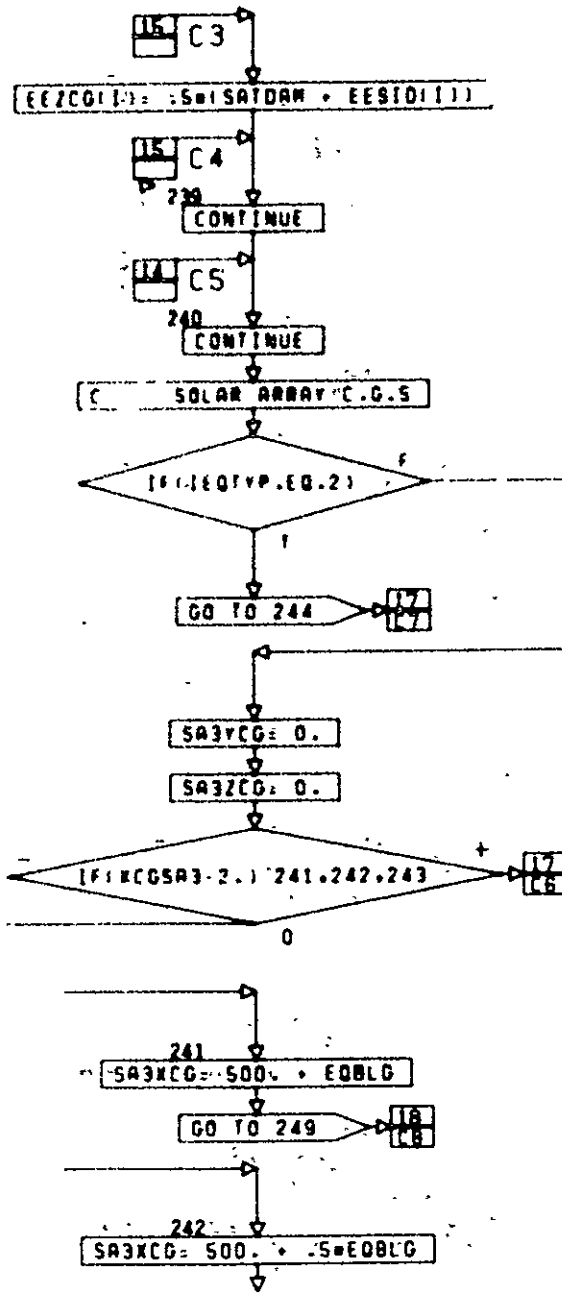


CONT. ON PG. 15

PG 1 OF 26

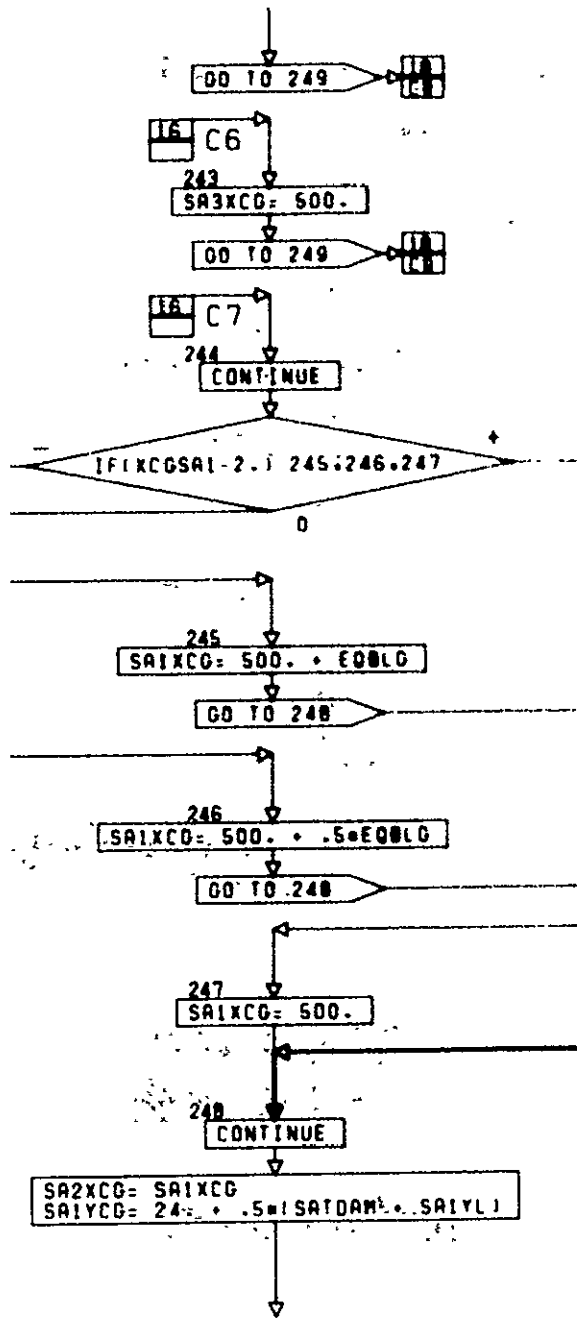


CONT. ON PG 16



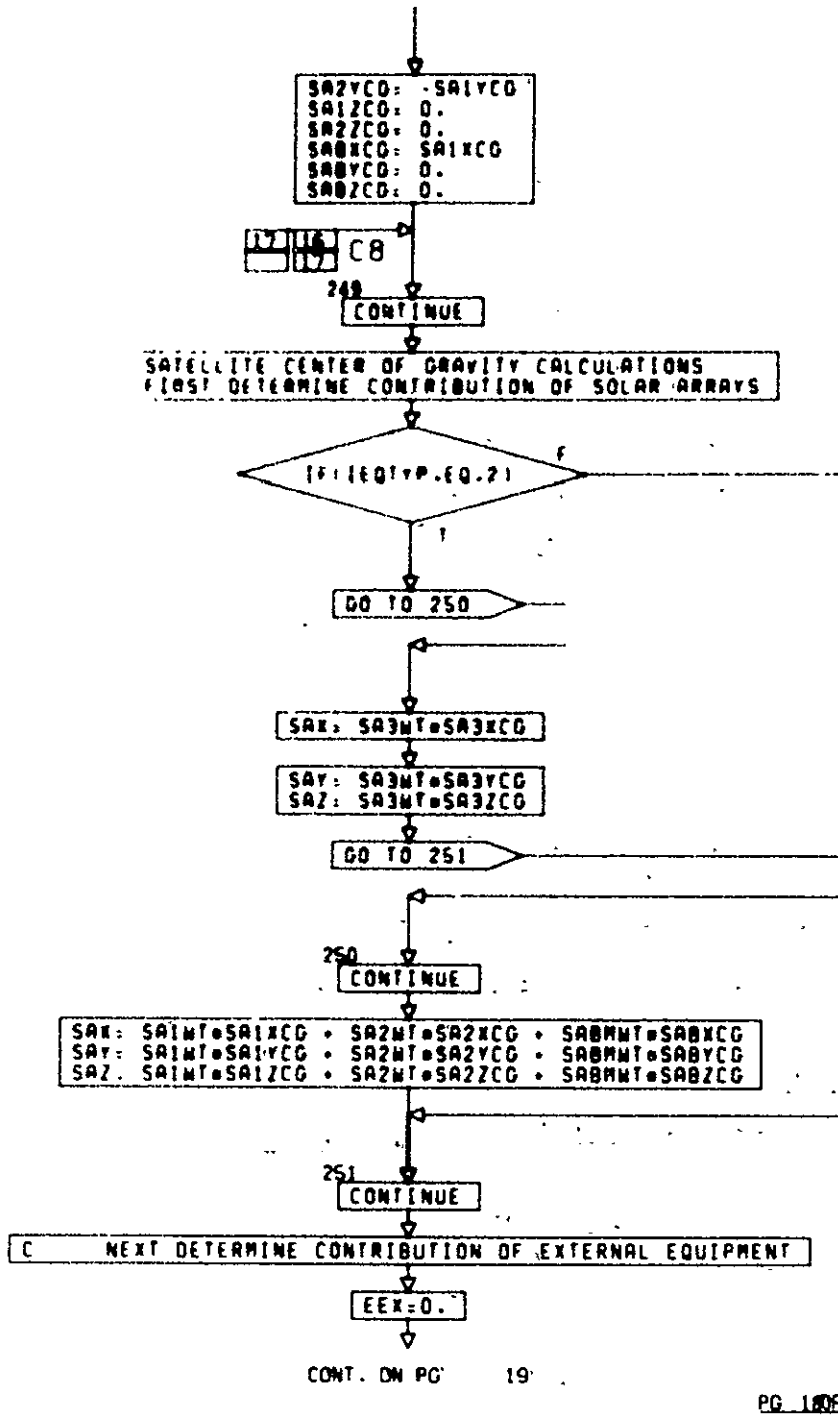
CONT. ON PG - 17

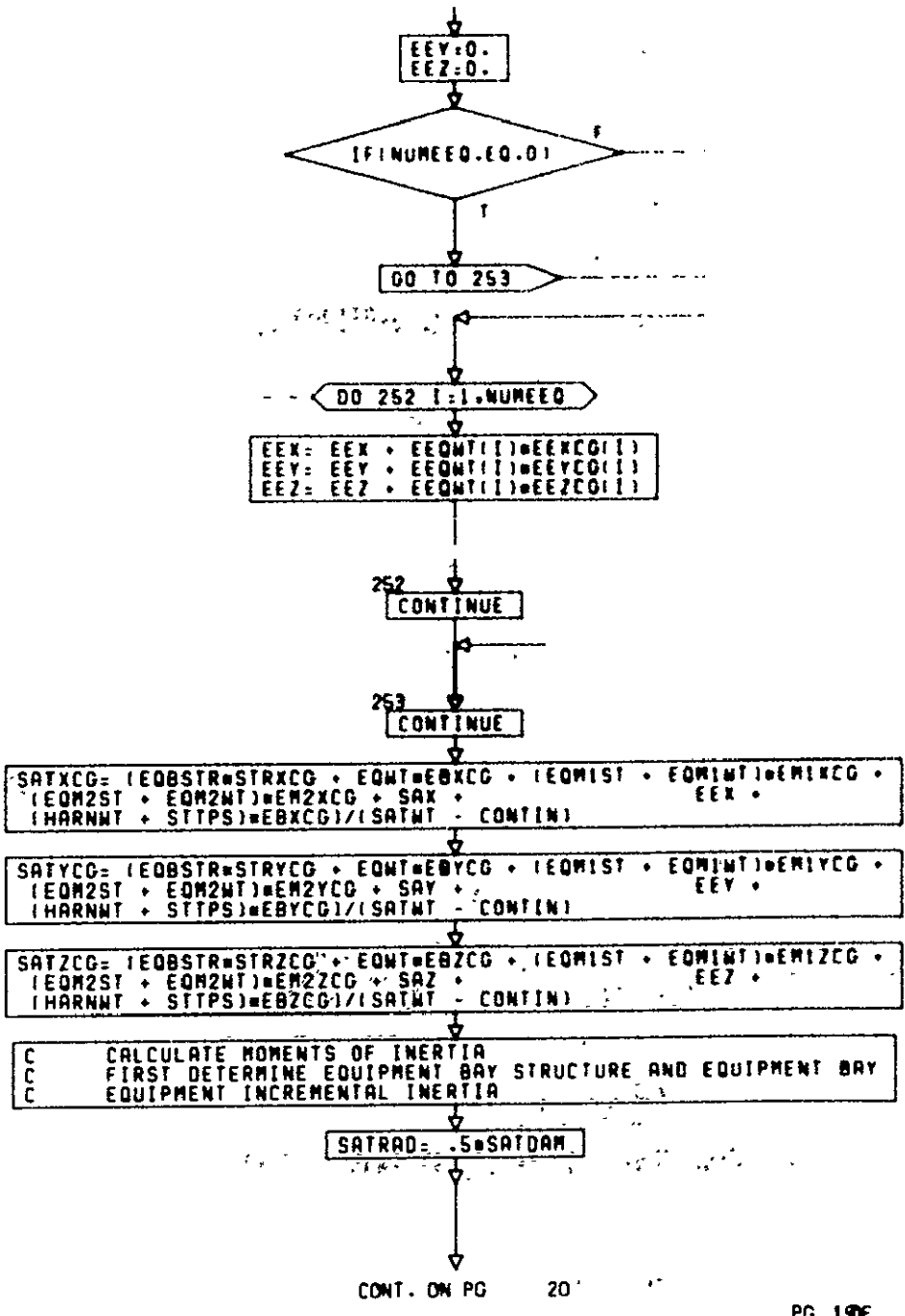
PG 16F 26



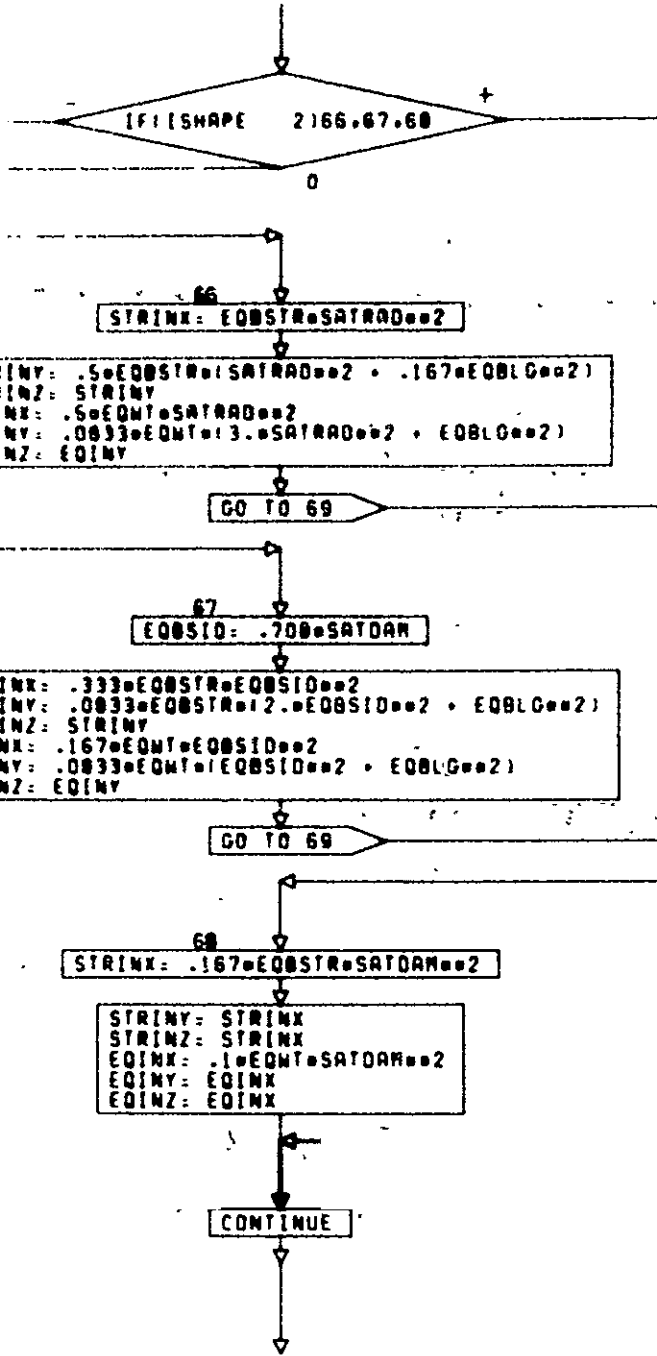
CONT. ON PG 18

PG 17F 26





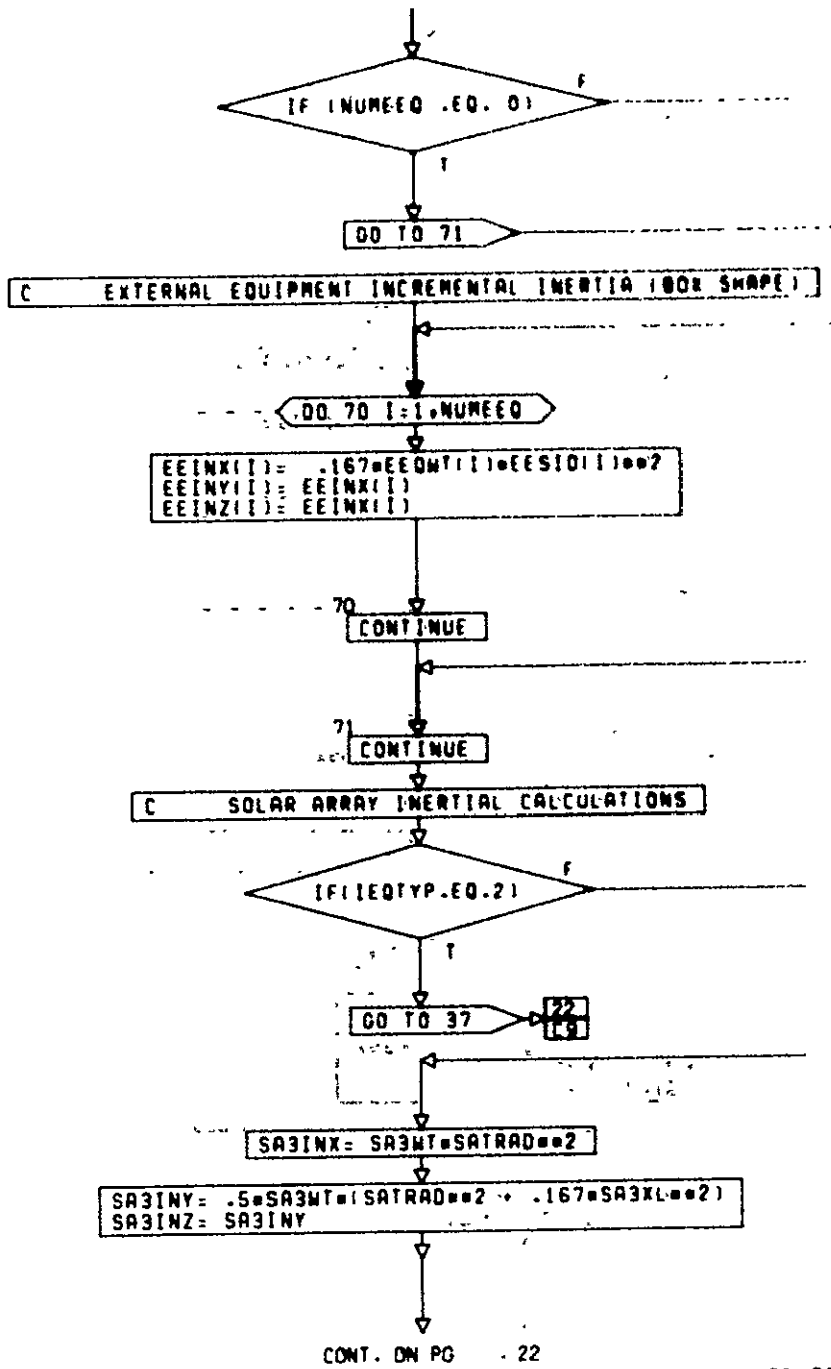
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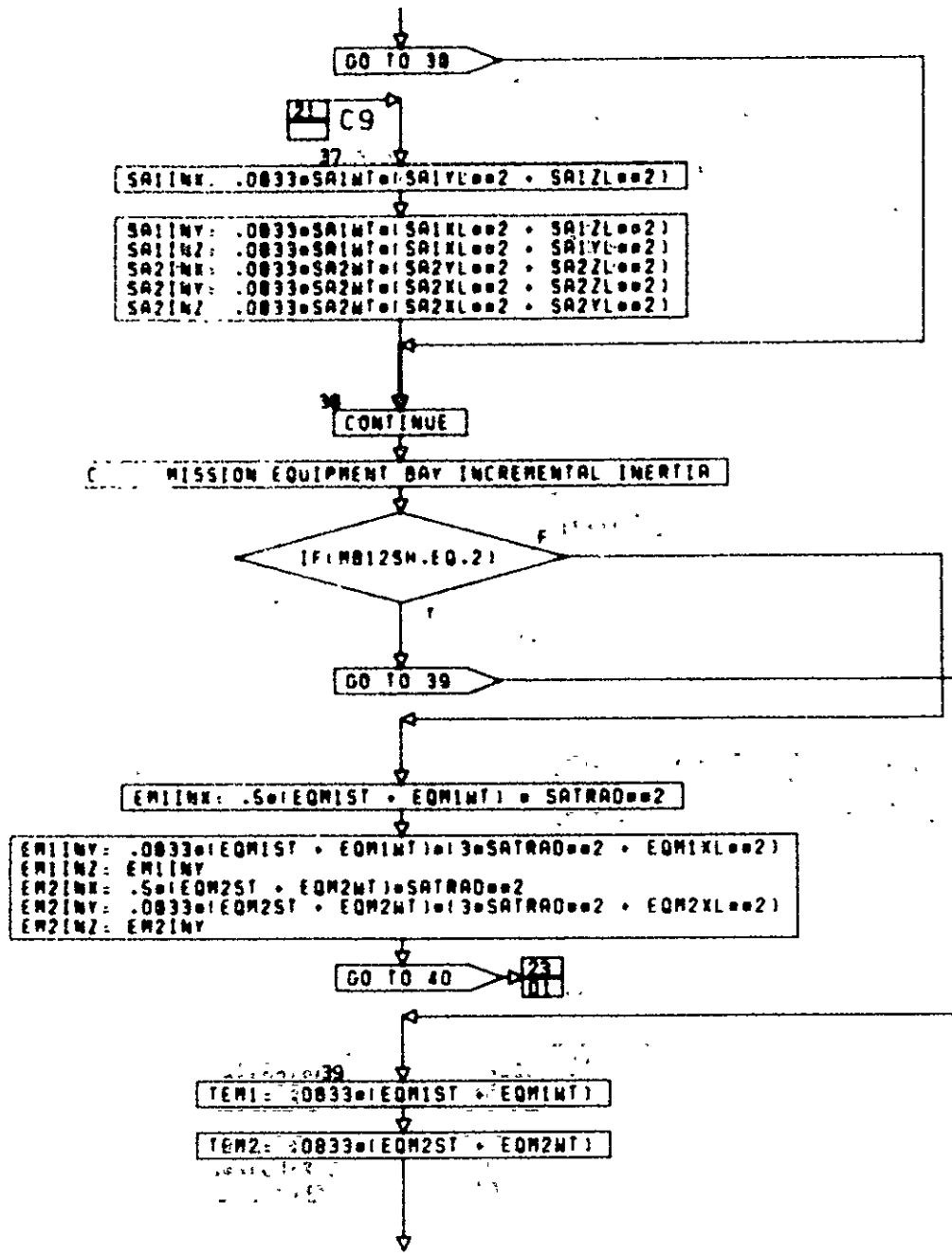


ORIGINAL PAGE IS  
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CONT. ON PG







CONT. ON PG 23

PG 22F 26

```

EM1IX= TEM1*(EQM1YL**2 + EQM1ZL**2)
EM1IY= TEM1*(EQM1ZL**2 + EQM1XL**2)
EM1IZ= TEM1*(EQM1YL**2 + EQM1XL**2)
EM2IX= TEM2*(EQM2YL**2 + EQM2ZL**2)
EM2IY= TEM2*(EQM2ZL**2 + EQM2XL**2)
EM2IZ= TEM2*(EQM2YL**2 + EQM2XL**2)

```

CONTINUE

```

EQM1D= EQM1M + EQM1S
EQM2D= EQM2M + EQM2S

```

C SATELLITE TOTAL INERTIA CALCULATIONS  
C FIRST DETERMINE CONTRIBUTION OF SOLAR ARRAYS

IF (EQTYP.EQ.2)

GO TO 41

```

SAIX= SA3IX + SA3MT*((SATYCG-SA3YCG)**2 + (SATZCG-SA3ZCG)**2)
SAIY= SA3IY + SA3MT*((SATZCG-SA3ZCG)**2 + (SATXCG-SA3XCG)**2)
SAIZ= SA3IZ + SA3MT*((SATYCG-SA3YCG)**2 + (SATXCG-SA3XCG)**2)

```

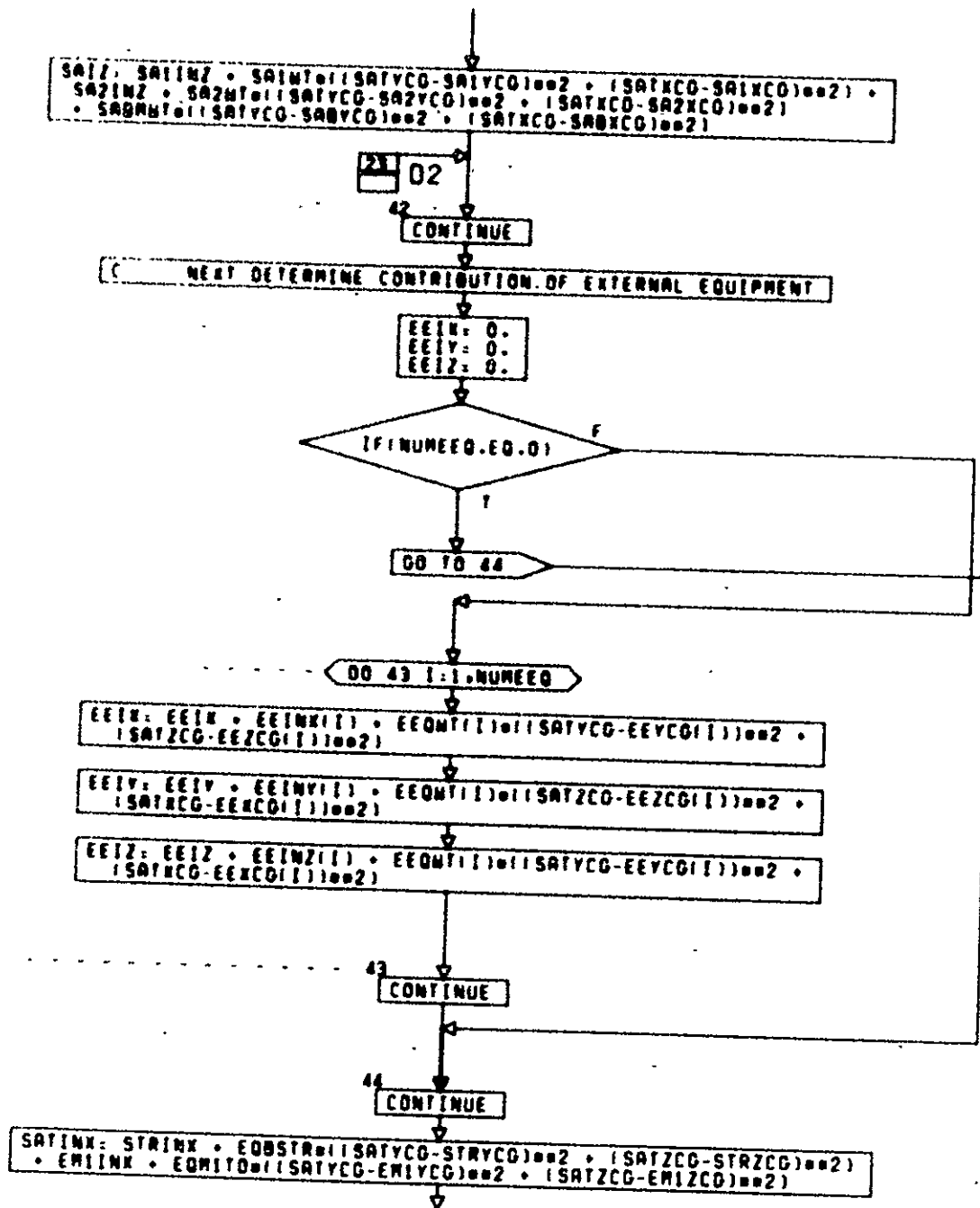
GO TO 42

CONTINUE

```

SAIX= SA1IX + SA1MT*((SATYCG-SA1YCG)**2 + (SATZCG-SA1ZCG)**2) +
SA2IX + SA2MT*((SATYCG-SA2YCG)**2 + (SATZCG-SA2ZCG)**2) +
SA3IX + SA3MT*((SATYCG-SA3YCG)**2 + (SATZCG-SA3ZCG)**2)
SAIY= SA1IY + SA1MT*((SATZCG-SA1ZCG)**2 + (SATXCG-SA1XCG)**2) +
SA2IY + SA2MT*((SATZCG-SA2ZCG)**2 + (SATXCG-SA2XCG)**2) +
SA3IY + SA3MT*((SATZCG-SA3ZCG)**2 + (SATXCG-SA3XCG)**2)

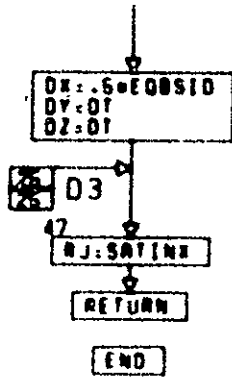
```



CONT. ON PG 25

PG 24F 26





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SUBROUTINE EP (IPIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)

```

C *****
C SUBROUTINE EP -
C WILL SELECT AND SIZE THE ELECTRICAL SUBSYSTEM WHICH WILL BE
C THESE CONFIGURATIONS AS FOLLOWS -
C NCONF (1) = 1 IS DUAL SPIN
C NCONF (1) = 2 IS YAW SPIN
C NCONF (1) = 3 IS MASS EXPULSION
C NCONF (1) = 4 IS MASS EXPULSION/MOMENTUM BIAS)
    
```

```

C NCONF (1) = 5 IS PITCH MOMENTUM BIAS
C NCONF (5) = 1 IS SHUNT PADDLE
C NCONF (5) = 2 IS SHUNT BODY
C NCONF (5) = 3 IS S * D PADDLE
C NCONF (5) = 4 IS S * D BODY
C NCONF (5) = 5 IS SERIES PADDLE
C NCONF (5) = 6 IS SERIES BODY
C NCONF (6) = 1 IS CYLINDER
    
```

```

C NCONF (6) = 2 IS BOX
C NCONF (6) = 3 IS SPHERE
C *****
C A LIST OF THE VARIABLES FOLLOWS -
C
C VARIABLE HOW USED FROM TO DEFAULT DESCRIPTION
    
```

A	INT	EP	EP	FT ME * MP
A1	INT	EPS	EPS	FT**2 ARRAY AREA
A32	INT	EP	EP	Area(3/2)
ALT	I,INT	USER	EPR	H1 ALTITUDE
AREA	0	EPS	YESIZE	FT**2 ARRAY AREA
CA	INT	EPS	EPS	A-W MIN REQ CP
CAPMAX	INT	DB	EPR	A-W MIN REQ CP
CCELL	INT	DB	EPS	A-W CAP SEL CL

CHMINT	INT	EPS	EPS	2.0	MRS MIN CHO TMO
CI	INT	EPS	EPS		A-WMIN INST CP
CISTAR	INT	EPS	EPS		A-WCAP SEL CEL
CR	INT	EPS	EPS		M-WMIN REQ CAP
DATA8	I,INT,0	MAIN	EPR, EPS		DATA BASE
DELF	INT	EPS	EPS	.03	XMIS LOSS
DELT	INT	EPS	EPS	.02	FAB LOSS
DELM	INT	EPS	EPS	.01	MISC LOSS

DELR	INT	EPS	EPS	.06 OR .3	RAD DEG FAC
DELT	INT	EPS	EPS	TABLE	TEMP CORR.
ETAC	INT	DB	EPR	1.0	EFF CHGR
ETAD	INT	DB	EPR, EPS	0.85	EFF DISCH
ETAE	INT	DB	EPR, EPS	0.65	EFF BATT
ETAI	INT	EPS	EPS	0.105	SOLAR CL EFF
ETALR	INT	DB	EPR	0.90	EFF LD REQ
ETAR	INT	EPR	EPR, EPS	1.0	PWR DIST LS

CONT. ON PG 2

PG 1 OF 37

C	FS	INT	EPS	EPS		SIZE FACT.
C	FM	INT	EPS	EPS		WT FACTOR
C	MEOR	INT	EP	EP	20.9026FT	RAD EARTH
C	HP	INT	EP	EP		ME/A
C	I	INT	EP	EP		FT PERIGEE
C	ICCU	INT	EPR	EPR		INT INDEX
C	ICELL	INT	EPS	EPS		CCU INDEX
						COL INDX CL
C	ICELLE	INT	EPS	EPS		END CELLS
C	ICM	INT	EPR	EPR		AMP CHG CURR
C	ICMOR	INT	EPR	EPR		COL INDX CH
C	ICMOR2	INT	EPS	EPS		END CHGRS
C	ICHOSE	0	EPR, EPS	MAIN		HMOR IO
C	ICONF	INT	EPR, EPS	EPR, EPS		VAR ON CONF
C	IDB	I	MAIN	EPR, EPS		LAST HMOR
C	IDR	INT	EPR	EPR		COL INDX DR
C	IDRE	INT	EPR	EPR		END DISCH
C	IERR	0	EPR	MAIN		ERROR FLD
C	ILB	INT	EPR	EPR		COL INDX LR
C	ILRE	INT	EPR	EPR		END LR
C	IPCU	INT	EPR	EPR		PCU INDEX
C	IPCUE	INT	EPR	EPR		ENO PCU
C	IPD	INT	EPR	EPR		PD INDEX
C	IPDE	INT	EPR	EPR		ENO PD
C	IPIC	I, 0	EPR, EPS	MAIN		HMOR INDEX
C	ISPD	INT	EPR	EPR		SPD INDEX
C	ISPDE	INT	EPR	EPR		END SPD
C	ISR1	INT	EPR	EPR		SR1 INDEX
C	ISR1E	INT	EPR	EPR		END SR1
C	ISR2	INT	EPR	EPR		SR2 INDEX
C	ISR2E	INT	EPR	EPR		END SR2
C	NI	INT	EPS	EPS	1.02	BATT PKG F
C	N2	INT	EPS	EPS	1.4	BAT ST WT F
C	LWBOO	INT, 0	EPR	EPR, REL	0.3	AV DP DISCH
C	LWBOG	INT	EPS	EPS		ORINT FACT
C	LWOP	INT	EPS	EPS	0.9	SLR PKG FAC
C	MU	INT	EP	EP	1.408E16	CONSTANT
C	M	INT	EP	EP		EARTH RATE
C	NO	INT	EPS	EPS	2	NO BATT
C	NC	INT	EPS	EPS		NO SLR CELL
C	NCCU	INT	EPR	EPR		NO. CCU
C	NCH	INT	EPS	EPS	2	NO CHGRS
C	NCHOSE	0	EPR, EPS	MAIN		NO. EQUIP.
C	NCONF(1)	I, EPS, 0	MAIN	EPS, MAIN		SANDC MACRO
C	NCONF(5)	I, EP, 0	MAIN	EP, MAIN		EP MACRO
C	NCONF(6)	I, EPS, 0	MAIN	EPS, MAIN		VSIZE MACRO
C	NO	INT	EPR	EPR		NO DISCH RG
C	NLR	INT	EPR	EPR		NO LD REG
C	NPCU	INT	EPR	EPR		NO. PCU
C	NPD	INT	EPR	EPR		NO. PD

CONT. ON PG 3

PG 2 OF 37



C	NSPD	INT	EPR	EPR	NO. SPD	•
C	NSR	INT	EPR	EPR	NO SMNT REG	•
C	OPTEMP	I	USER	EP	15. DEG. C BAT TEMP	•
C	PBOL	INT	EPR	EPR, EPS	NATIPMR 0.0.L.	•
C	PO	INT	EPR	EPR	NATIBAT PWR-REG	•
C	PEXCES	INT	EPR	EPR, EPS	NATIPMD 20 DISP	•

C	PIE	INT	EPS	EPS	9.14159	CONSTANT	•
C	PL	I	ALL S/S	EPR		NATY AV PWR LO	•
C	PLMIN	I	ALL S/S	EPR		NATY MIN PWR LO	•
C	PLR	INT	EPR	EPR		NATITOT PWR LRE	•
C	PLRD	0	EPR	INTERNAL		NATIPMR DISP LB	•
C	PS	INT	EPR	EPR, EPS		NATIEOL SOL OUT	•
C	RFD	INT	EPS	EPS		TEMP DEG FC	•
C	S	INT	EP	EP		USED IN CALC OF TE	•

C	SOL	INT	EPS	EPS	1953	N/WZAV SOL INT	•
C	TE	INT	EPS	EPR		ECPS TIME	•
C	TEDTS	INT	EPS	EPS		DARK/LITE	•
C	VB	INT	EPS	EPS		F100JUNIT BATVOL	•
C	VBM	INT	EPR	EPS		VOCMIN BAT VLT	•
C	VBT	INT	EPS	EPS		F100TOT BAT VOL	•
C	VC	INT	EPS	EPS	1.1	VOCMIN CELL U	•
C	VCCELL	INT	DB	MAIN		M3VOL CELL	•

C	VDB	INT	EPR	EPR		VOCAVE ALL VOL	•
C	VOL	0	MAIN			F1003 EP VOL	•
C	MATE	INT, 0	EPS	VE SIZE		KG ARRAY WT	•
C	MB	INT	EPS	EPS		KGUNIT BAT WT	•
C	MBT	INT	EPS	EPS		KGTOT BAT WT	•
C	WCELL	INT	DB	EPS		LB CELL NOT	•
C	WT	0	MAIN			LOS EP WT	•

C .....

COMMON /USERS/ IVOLY,OPTEMP

COMMON /BTWN/WT,VOL,DT,0,DX,DY,0Z,XJ,YJ,ZJ,RJ,FF,II,PL,PLMIN,  
 LMBDD,AREA,SATLG,WATE,NC,ACSNP,HARNMT,THEWMT,CONVMT,TKWMT,PASSTR,  
 SATINT,TPRIM,IBTLOC,RADA,RADAB,RAT,HTRPWR,HTRPRB,  
 HPT,HTPIPE,VCHP,HTPT,FC,N,COART,ACSSN,BITRAT(2),  
 EQBLG,SABDLG,SATMT

COMMON /PRTCON/ACCRCY,CISTAR,IREL,MMDLD,TRUNC,ITRUNC,DE,TE,  
 TOOLR,OCR,SEIR,PMR,PE,PU,TOOLU,OCF,SEIP,PMP,SATR,SATINV,MEB,  
 MEINV,PAYR,PAYINV,PAUQUL,GSE,XLTDY,CTOT,FEER,FEEINV,ODTE,XVEST,  
 OPS,SKTAU(6),ROLD(6),TTY,AN,TS,BS,AM,YF,BF,TC,TA,TB,TDTOPS

COMMON /USER/EOM1WT,EOM2WT,DIAMAX,ALT  
 COMMON /DBCON/ IDB(30),DATAB(55,90)  
 DIMENSION NCONF(10), IPIC(5), ICHOSE(5), NCHOSE(5)  
 REAL MU,N,ICH,LMBDD,LMBDG,LMBDP,K1,K2

DATA DELF/.03/,DELI/.02/,DELM/.01/,ETAI/.105/,ETAR/1.0/,K1/1.02/,K

CONT. ON PG 4

PG 306 37

2/1.4/LMBDD/.9/SOL/1353/.VC/1.1/PIE/3.1415926/  
.CHMIN/2.0/

LMBDD=.3

C \*\*  
C \*\* INITIALIZATION \*\*

IF ITER.NE.01

GO TO 140

MEAN RADIUS OF EARTH IN FEET

ME=24.0530612E6

MU=1.407645E16  
MP=6076.0\*ALT  
A=MP\*ME  
A32=A\*\*1.5  
MEOA=ME/A  
S=1.02\*ARSIN(MEOA)  
N=SQRT(MU)/A32  
TEOTS=S/PIE-S

TE=2.0\*S/N  
RFD=.01\*OPTEMP\*1.0

DO 10 I=1.5

10 ICHOSE(I)=0

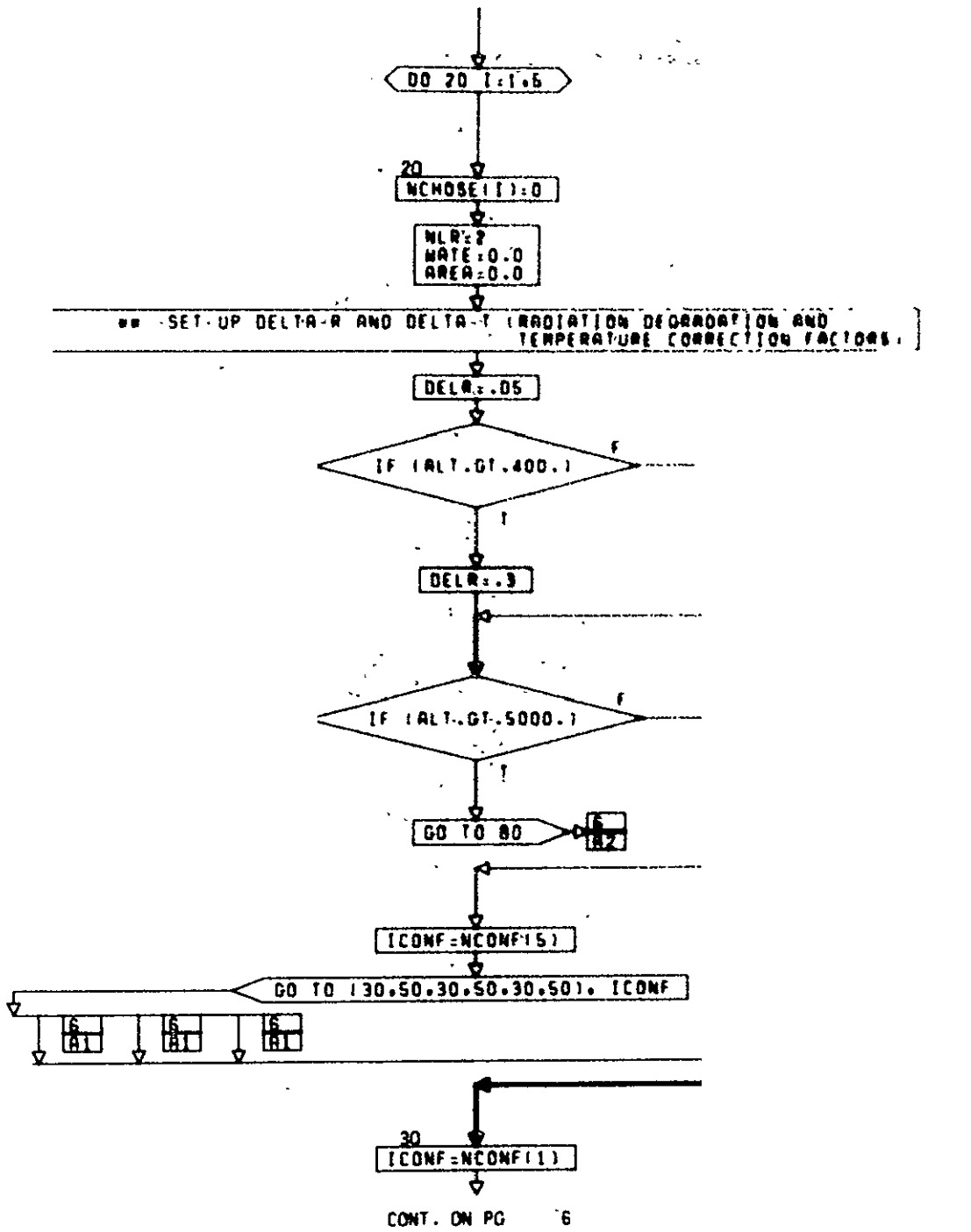
ITER=0

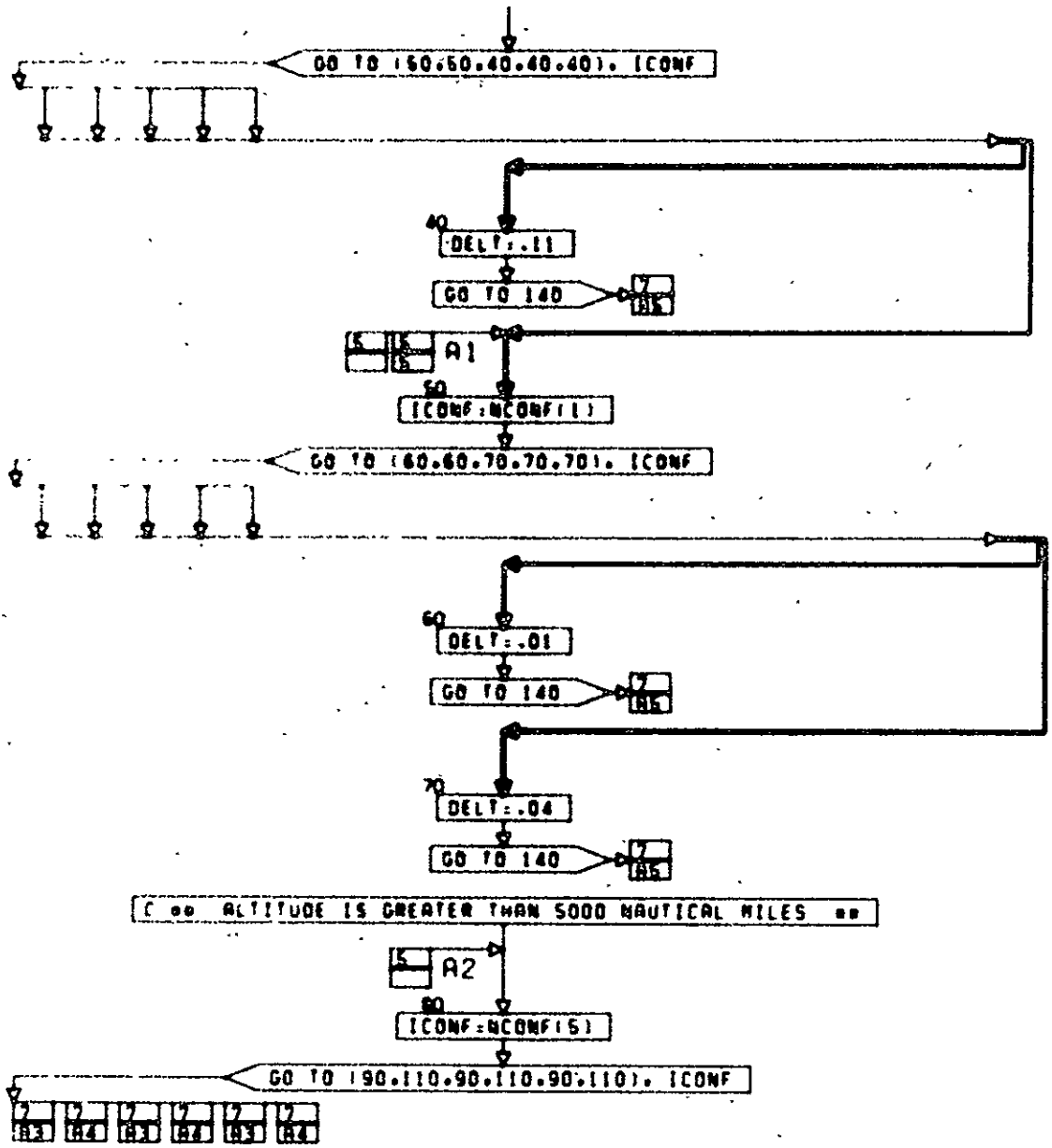
C \* LMBDD MUST GO TO REL

NB=2

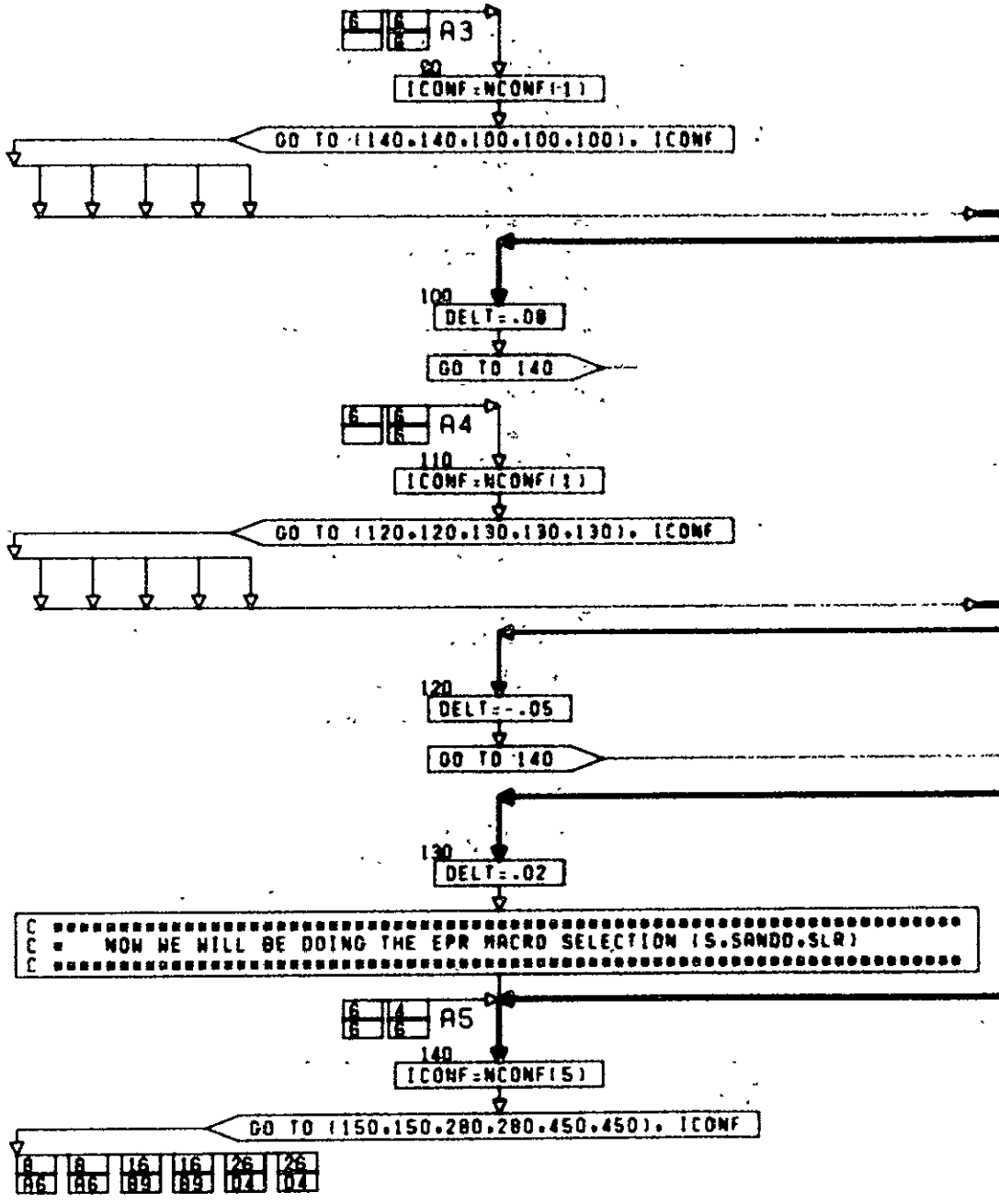
CONT. ON PG 5

PG 4 OF 37





CONT. ON PG



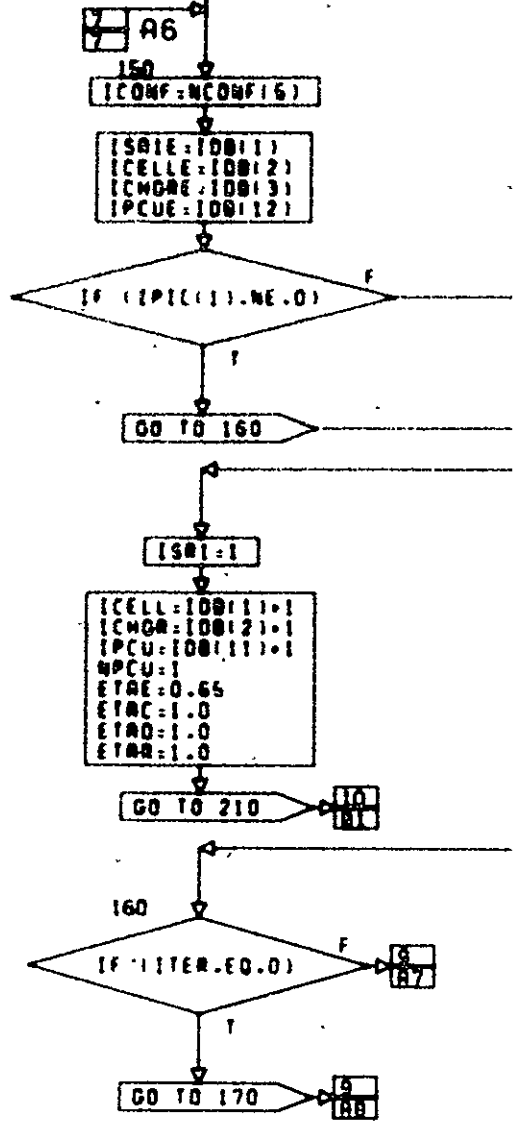
CONT. ON PG 8

PG 7 OF 37

ORIGINAL PAGE IS  
OF POOR QUALITY

10-222

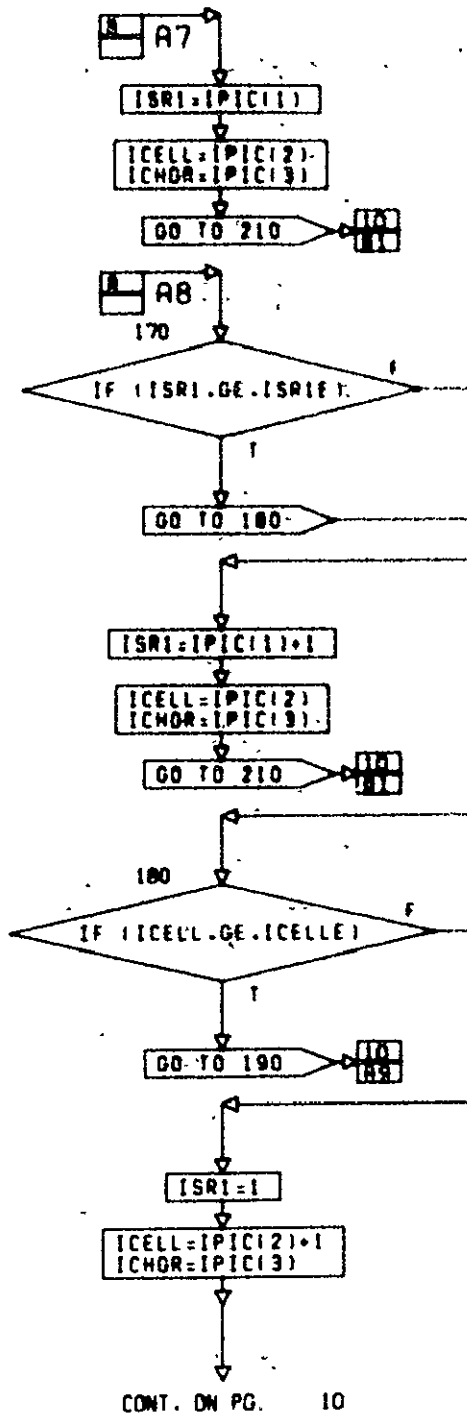
SHUNT REGULATION DESIGN

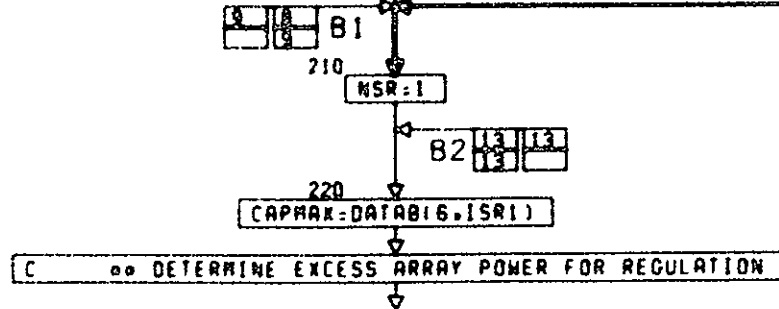
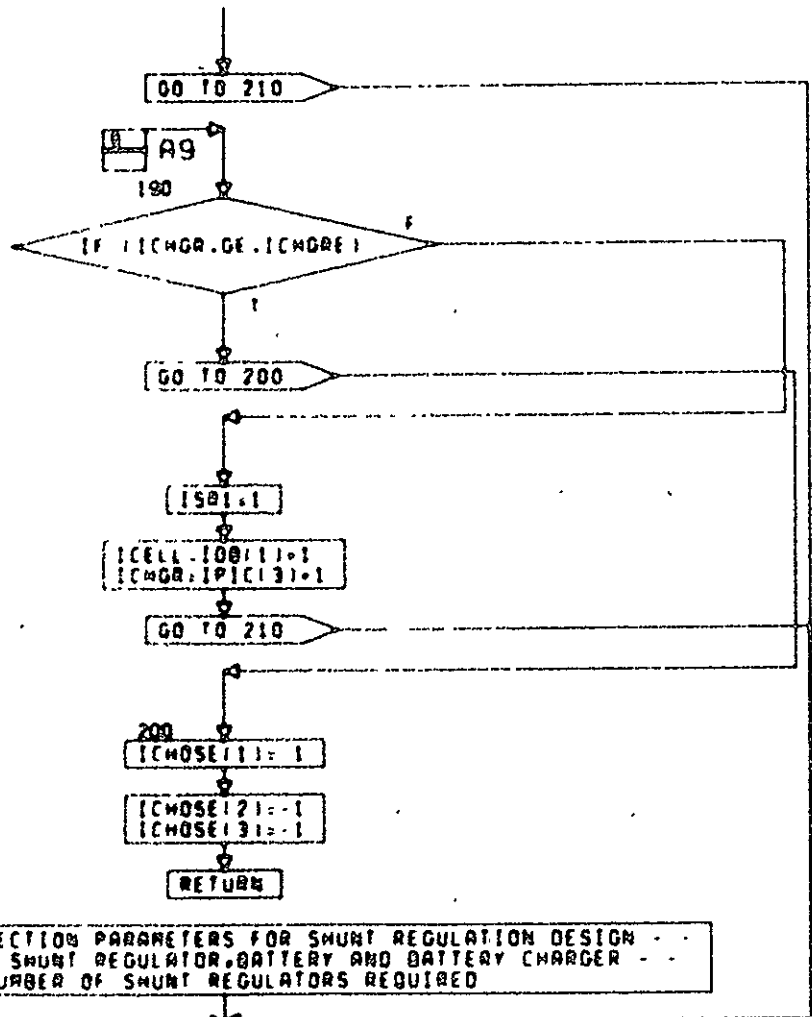


CONT. ON PG 9

PG 8 OF 37

ORIGINAL PAGE IS OF POOR QUALITY



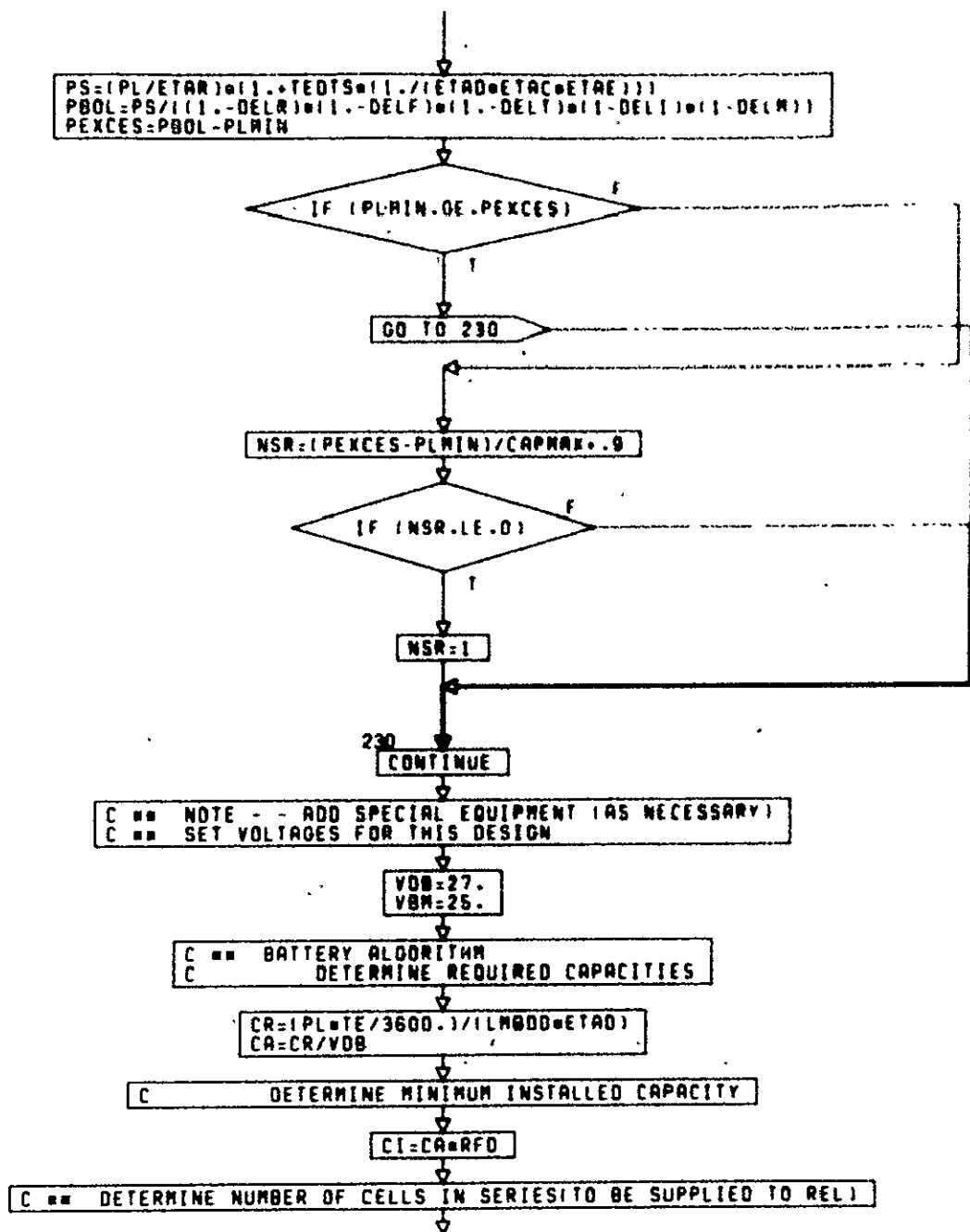


CONT. ON PG 11.

PG 10 OF 37

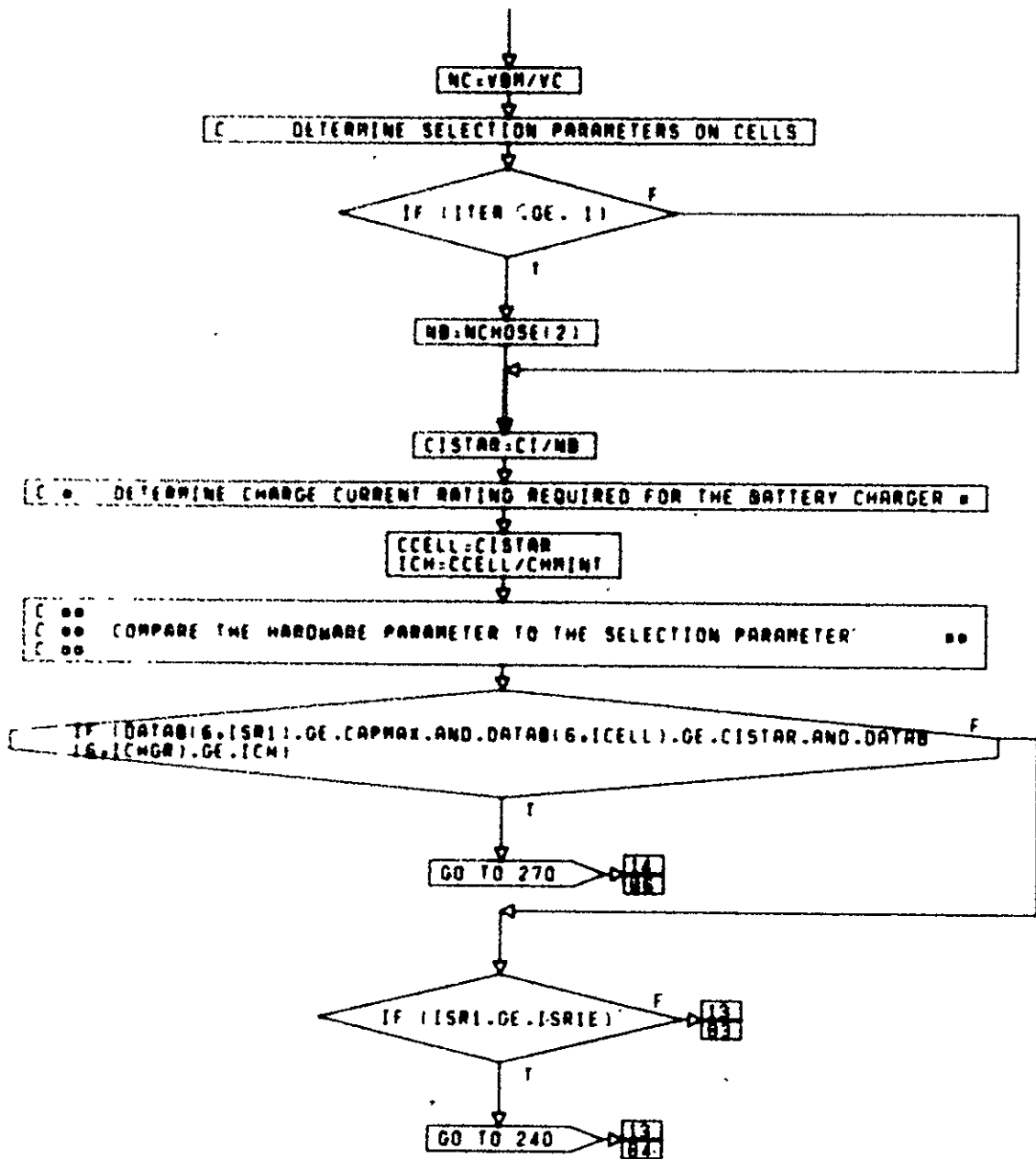
ORIGINAL PAGE IS  
OF POOR QUALITY





CONT. ON PG 12

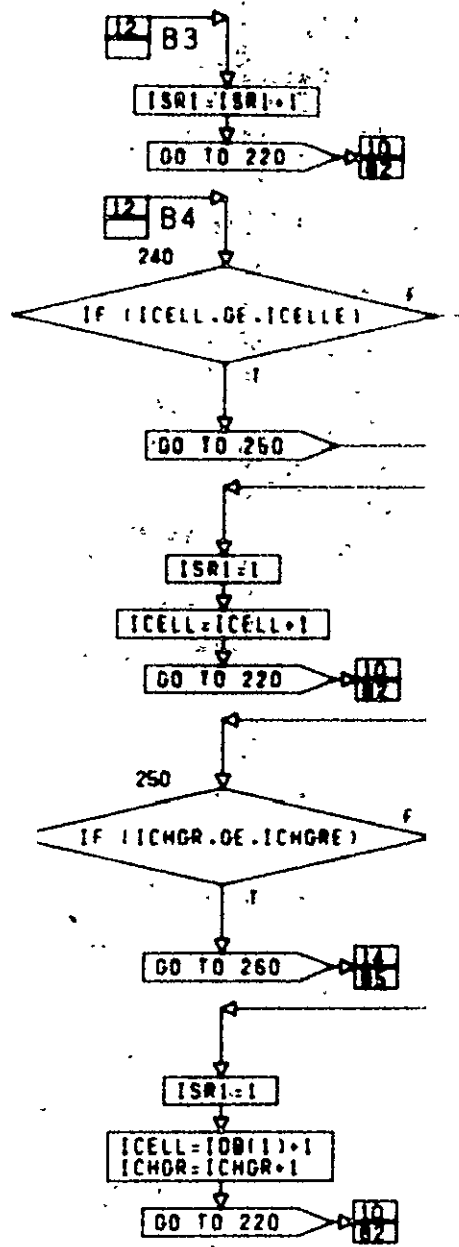
PG 1 OF 37



CONT. ON PG 13

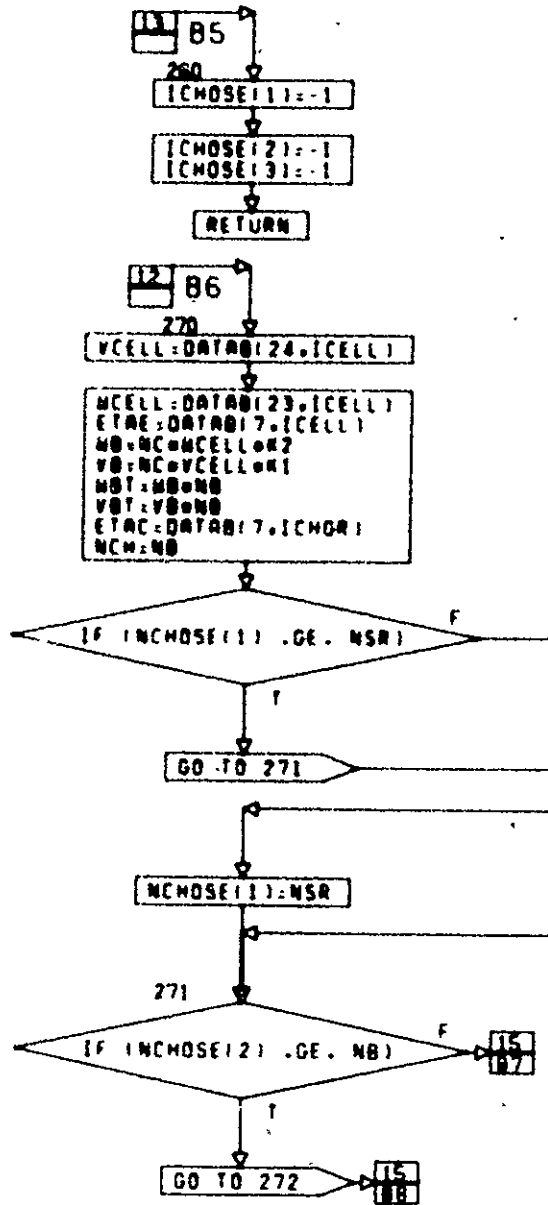
PG 12 OF 37

ORIGINAL PAGE IS  
OF POOR QUALITY



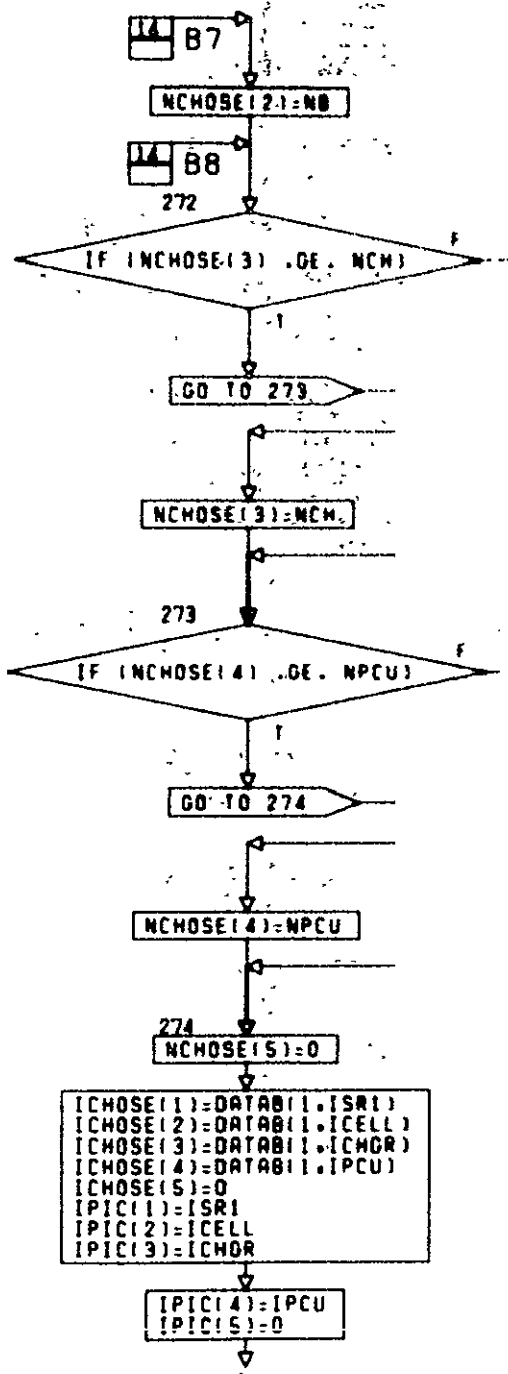
CONT. ON PG 14

PG 13F 37



CONT. ON PG 15

PG 1 OF 37



CONT. ON PG 16

PG 15 OF 37

ORIGINAL PAGE IS  
OF POOR QUALITY

MT=NSR=DATA(23,ISR1)+NBT=NCH=DATA(23,ICMR)+NPCU=DATA(23,PCU)  
+MT

VOL=NSR=DATA(24,ISD1)+VBT=NCH=DATA(24,ICMR)+NPCU=DATA(24,PCU)  
+VOL

GO TO 590

•• SHUNT AND DISCHARGE DESIGN ••

89

(CONF=NCONF16)

IDRE=IDB(4)  
ISR2=IDB(5)  
ICELL=IDB(2)  
ICMR=IDB(5)  
NCCU=1

IF (IPIC1) .NE. 01

GO TO 290

(DR=IDB(3))+1

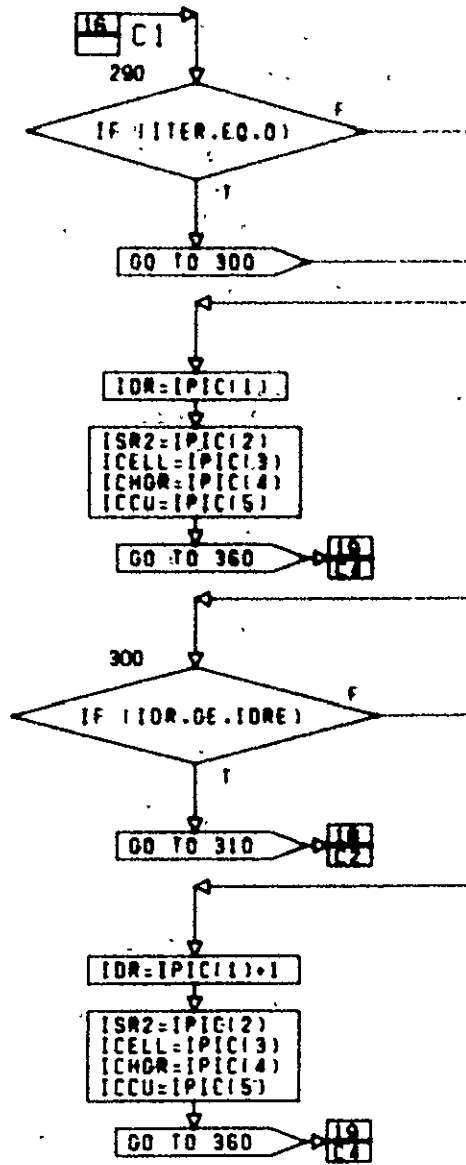
ISR2=IDB(4)+1  
ICELL=IDB(1)+1  
ICMR=IDB(5)+1  
ICCU=IDB(6)+1  
ETAD=0.85  
ETAC=1.0  
ETAE=0.65  
ETAR=1.0

GO TO 360

CONT. DN PG 17

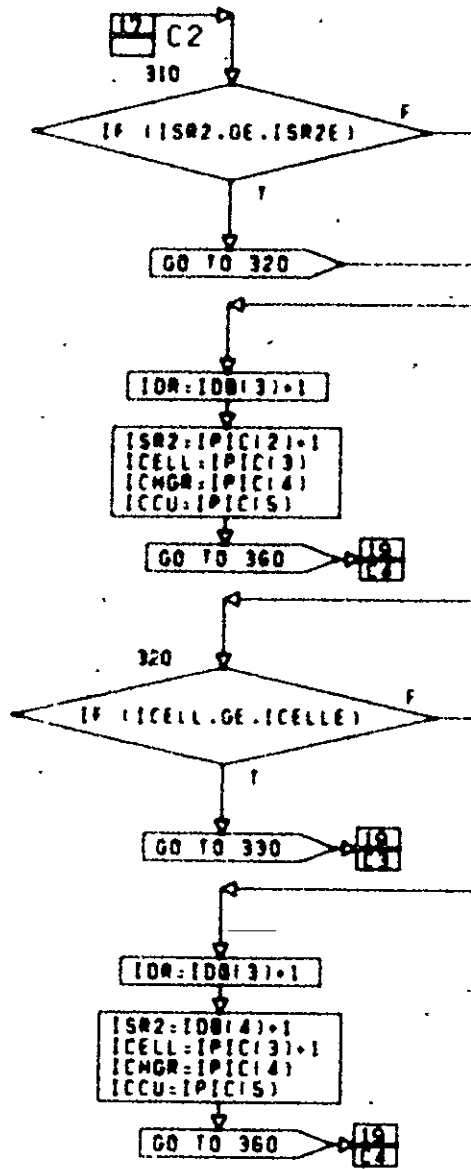
PG 18 OF 37

ORIGINAL PAGE IS  
OF POOR QUALITY

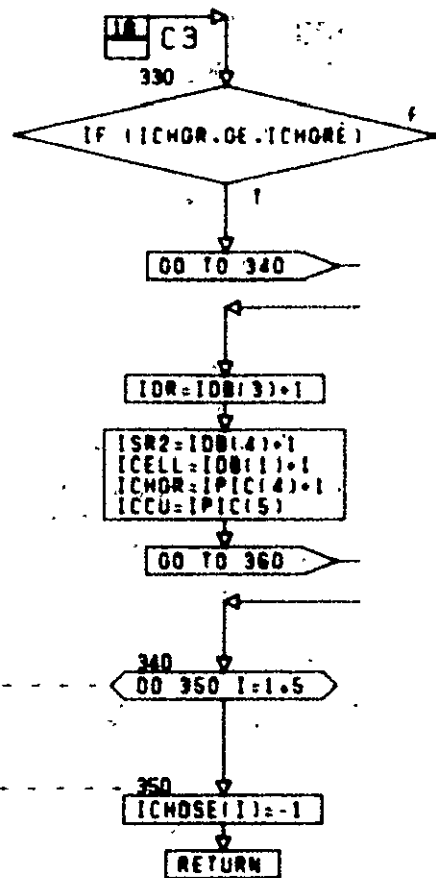


CONT. ON PG 18

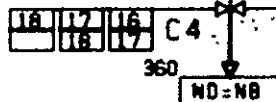
PG 17E 37







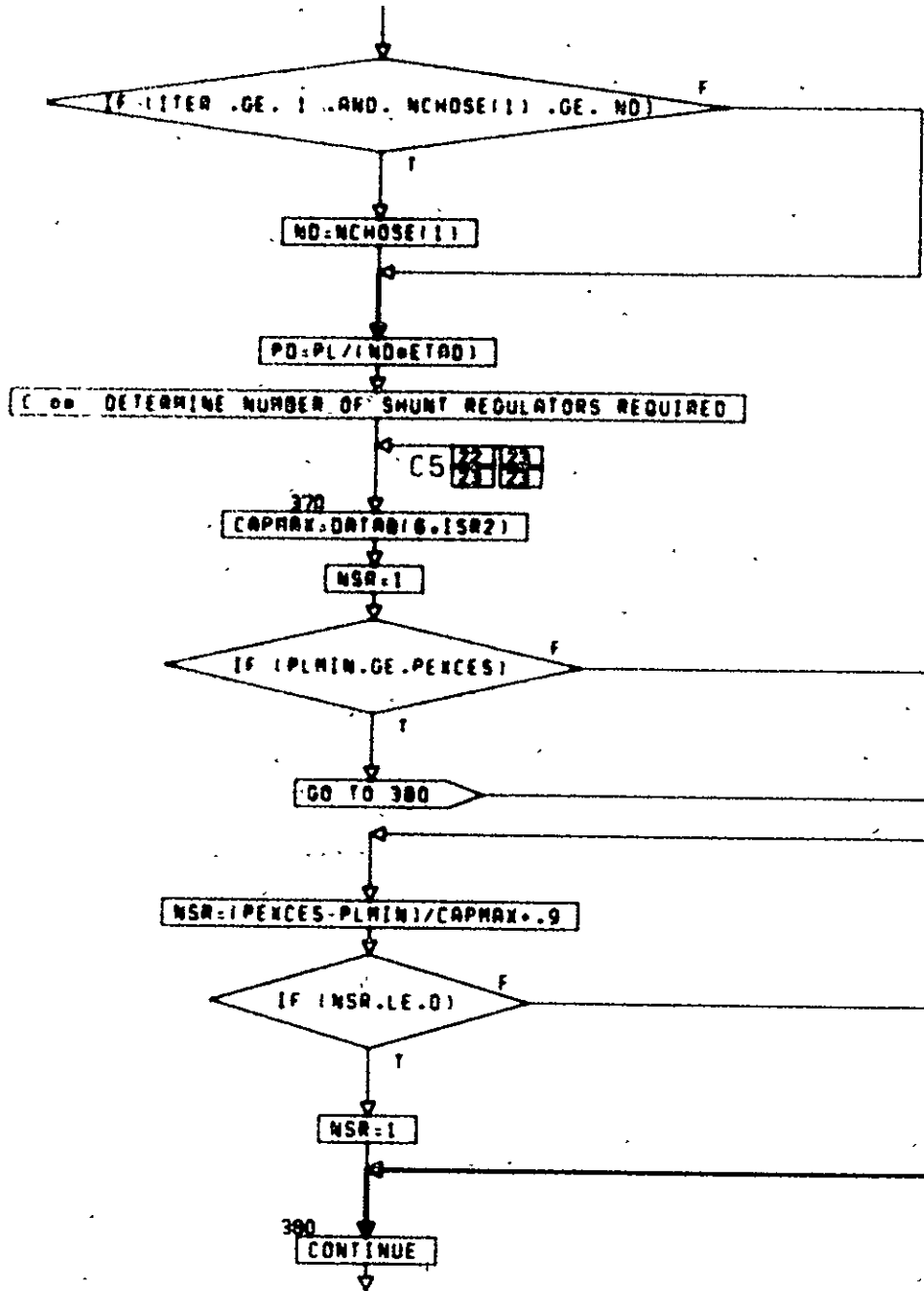
C ## COMPUTE SELECTION PARAMETERS FOR SHUNT AND DISCHARGE REGULATION  
 C ## THIS IS FOR DISCHARGE REGULATOR, SHUNT REGULATOR, BATTERY, BATTERY  
 C ## CHARGER AND SIZING THE CENTRAL CONTROL UNIT  
 C ## DETERMINE NUMBER OF DISCHARGE REGULATORS REQUIRED



C ## DETERMINE EXCESS ARRAY POWER FOR REGULATION

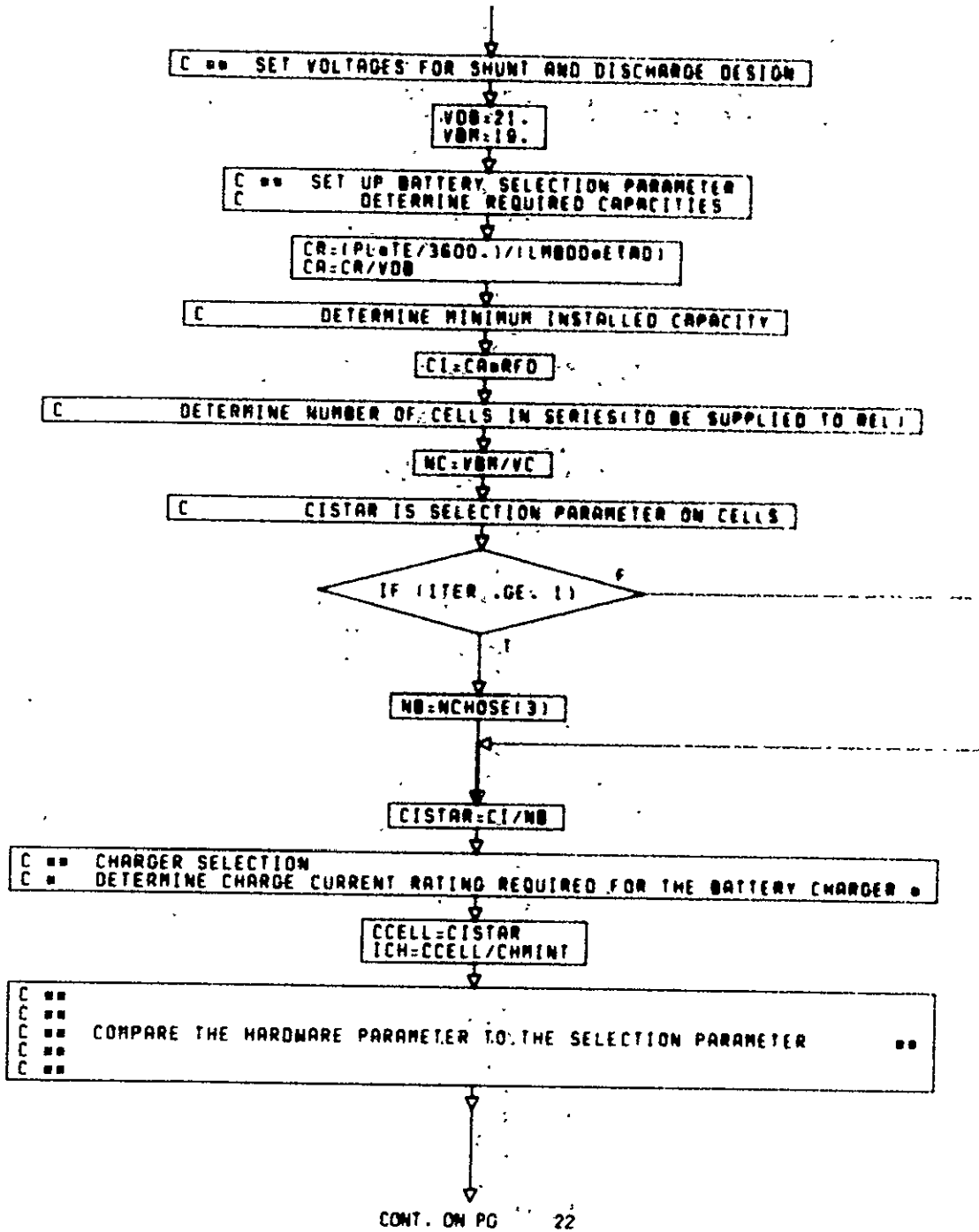
PS=(PL/ETAR)\*(1.+TEDTS\*(1./IETAD\*ETAC\*ETAE))  
 PBOL=PS/((1.-DELRL)\*(1.-DELF)\*(1.-DELT)\*(1-DELM))  
 PEXCES=PBOL-PLMIN

CONT. ON PG 20

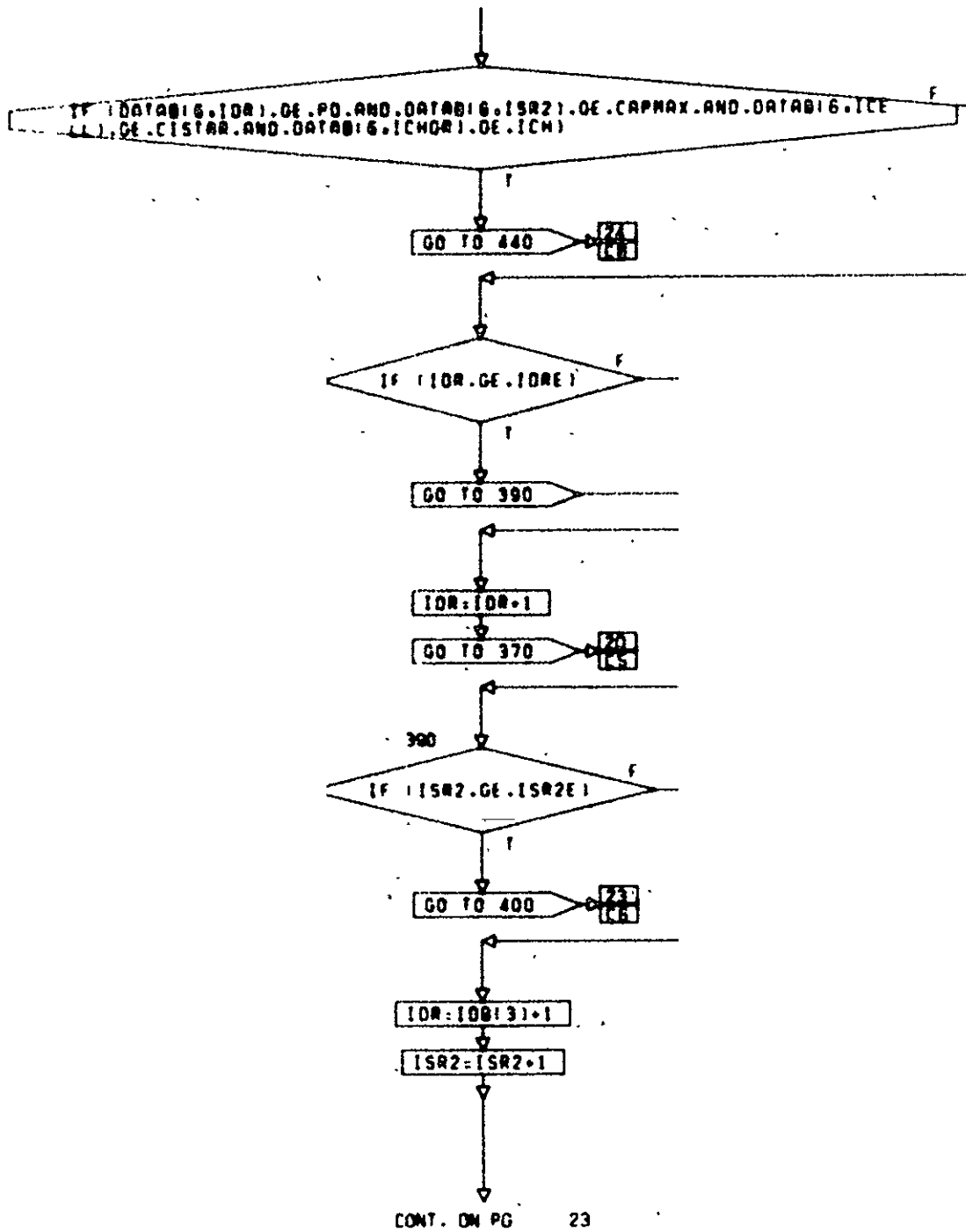


CONT. ON PG 21

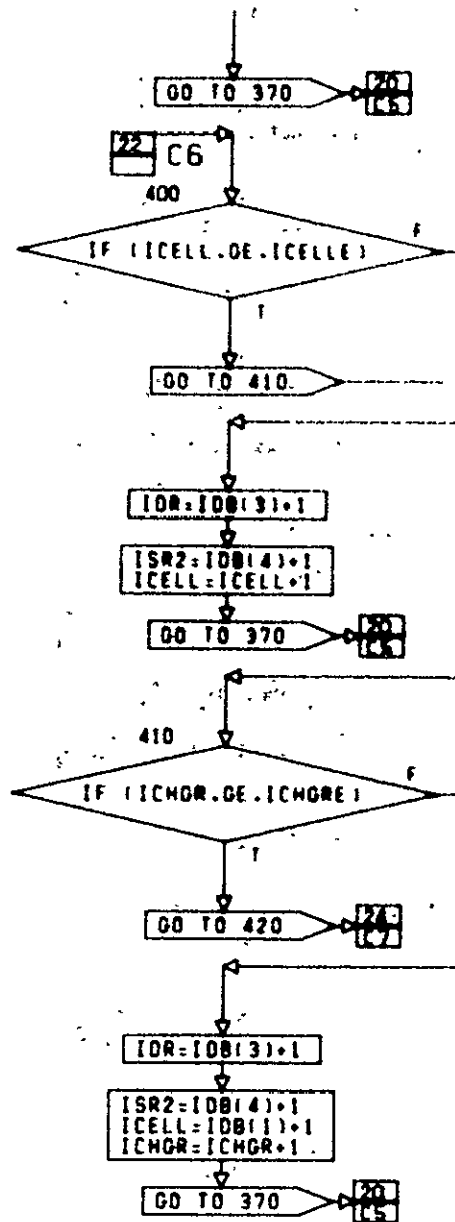
PG 20OF 37



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OF POOR QUALITY

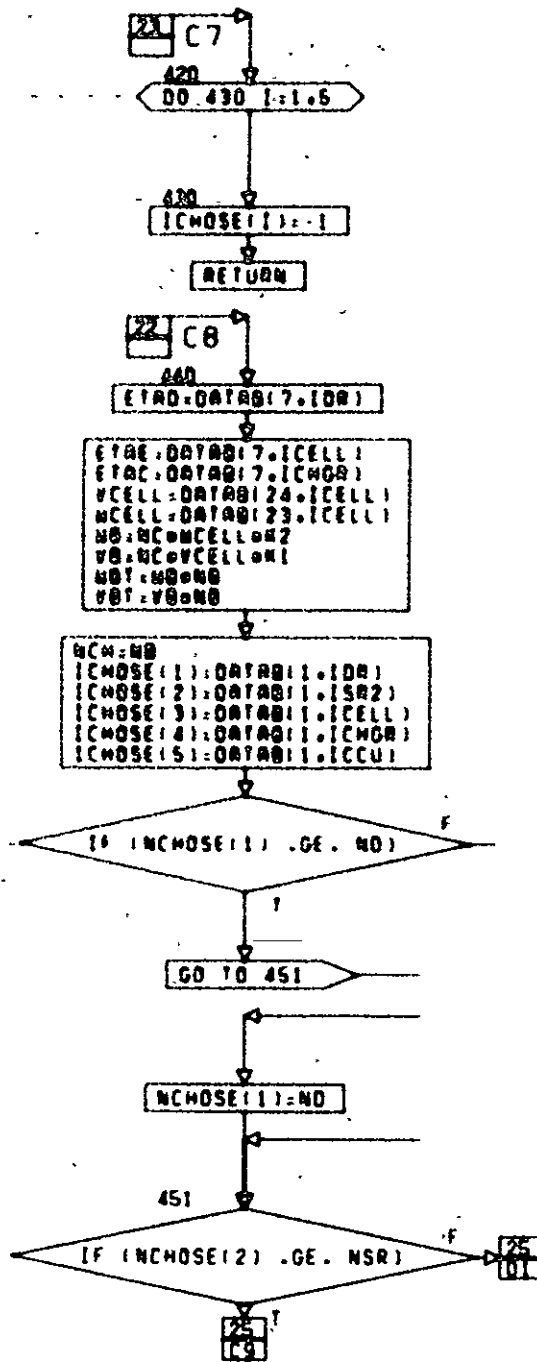


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OF POOR QUALITY



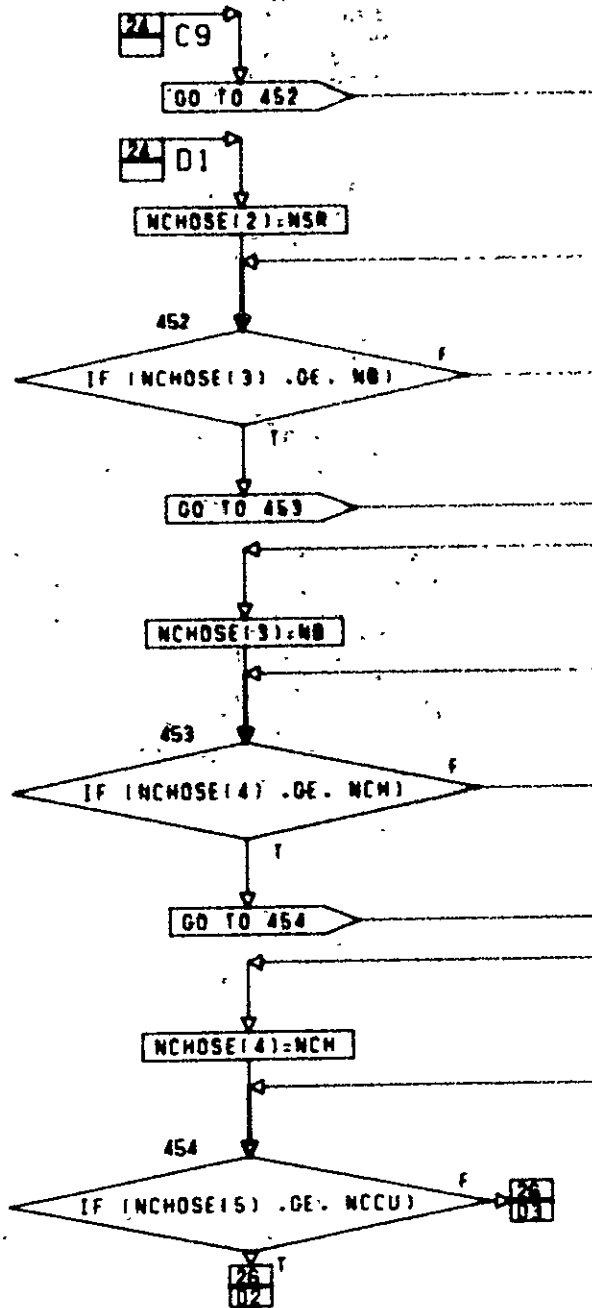
CONT. ON PG 24

PG 2 OF 37



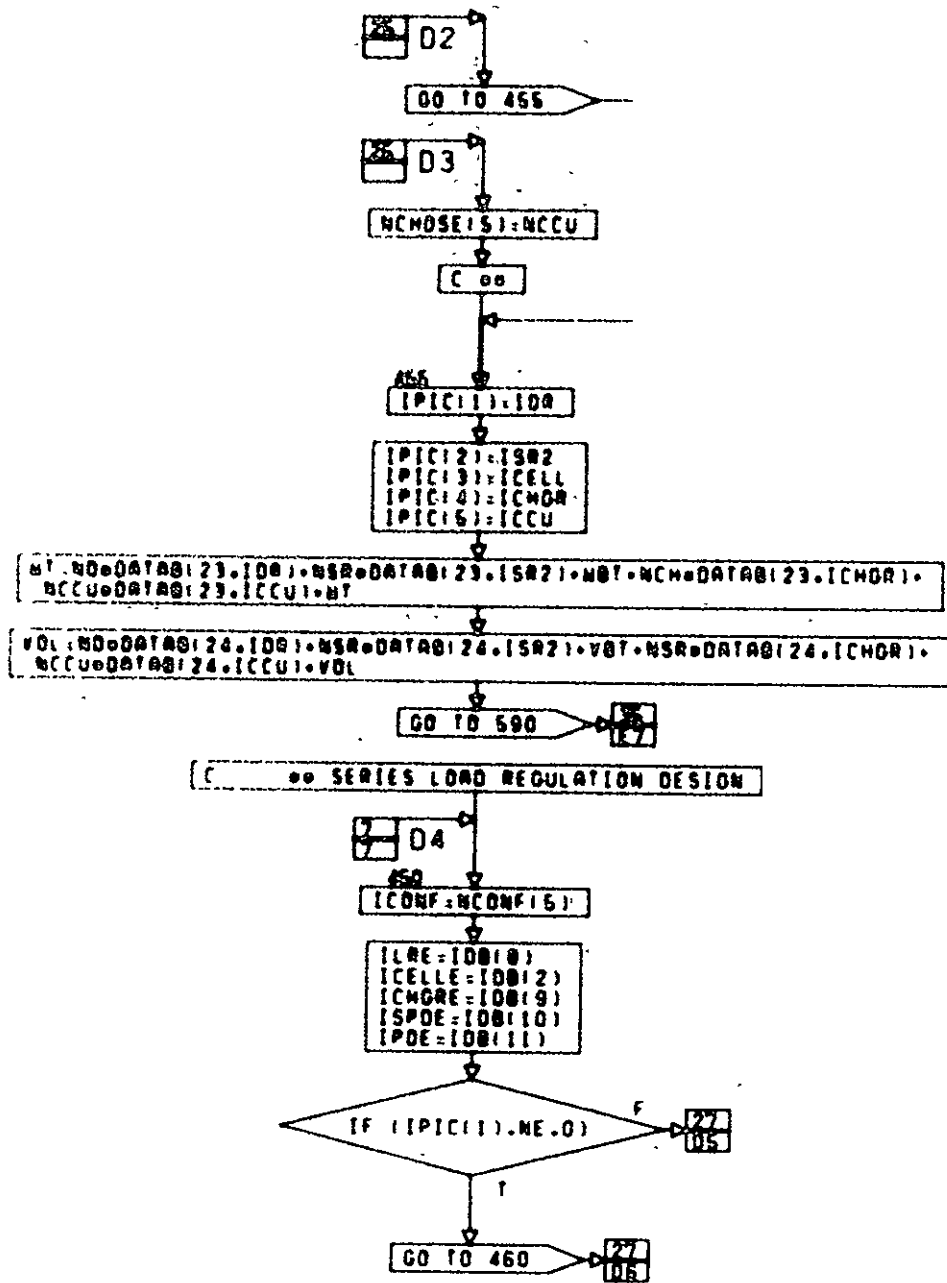
CONT. ON PG 25

PG 24F 37



CONT. ON PG 26

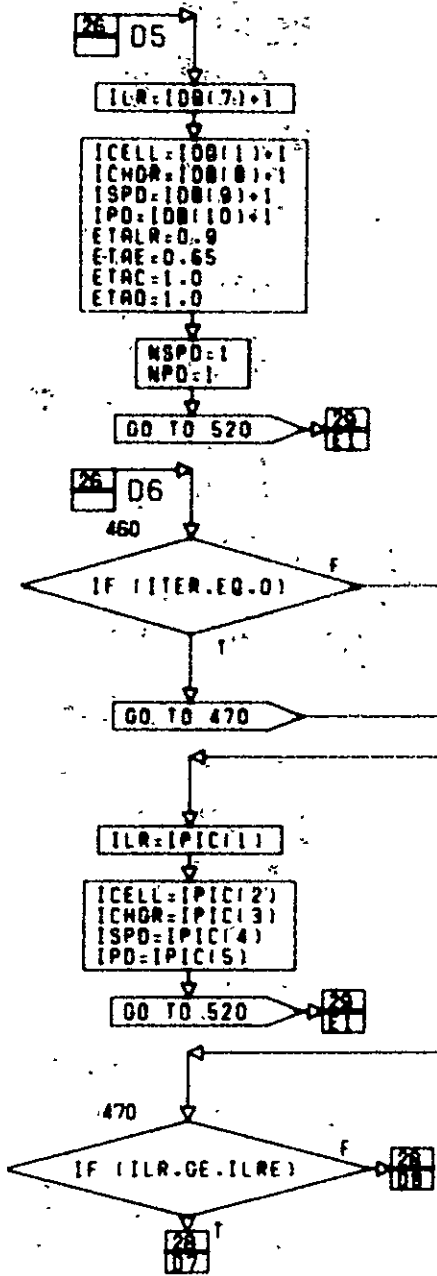
PG 25F 37



CONT. ON PG 27

PG 28 OF 37

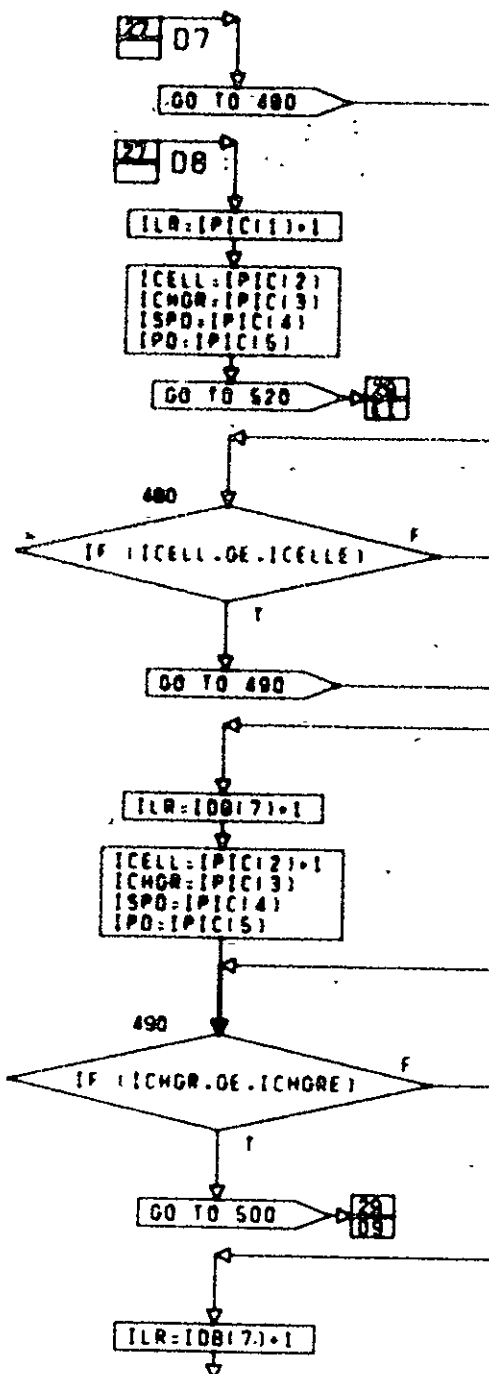




CONT. ON PG 28

PG 2DF 37

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ORIGINAL PAGE IS  
OF POOR QUALITY

CONT. ON PG 29

```

ICELL=IDB(I):1
ICMR=IPIC(I):1
ISPD=IPIC(I):4
IPD=IPIC(I):6

```

```

09

```

```

DO 510 I=1,6

```

```

510
NCHOSE(I):=1

```

```

RETURN

```

```

C == COMPUTE SELECTION PARAMETERS FOR SERIES LOAD REGULATION
C == THIS IS FOR THE LOAD REGULATOR, BATTERY, BATTERY CHARGER AND
C == SIZING THE SOLAR POWER DISTRIBUTOR AND POWER DISTRIBUTOR
C == NLR IS THE NUMBER OF LOAD REGULATORS REQUIRED

```

```

E1

```

```

520

```

```

NLR=2

```

```

C == DETERMINE EXCESS ARRAY POWER FOR REGULATION

```

```

PS=(PL/ETAR)*(1.+TEDTS*(1./(ETAD*ETAC*ETAE)))
PBOL=PS/((1.-DELR)*(1.-DELF)*(1.-DELT)*(1.-DELW)*(1.-DELM))
PEXCES=PBOL-PLMIN

```

```

C == DETERMINE SELECTION PARAMETERS FOR LOAD REGULATORS

```

```

IF (ITER .GE. 1 .AND. NCHOSE(I) .GE. NLR)

```

```

NLR=NCHOSE(I)

```

```

PLR=PL/(ETALR*NLR)

```

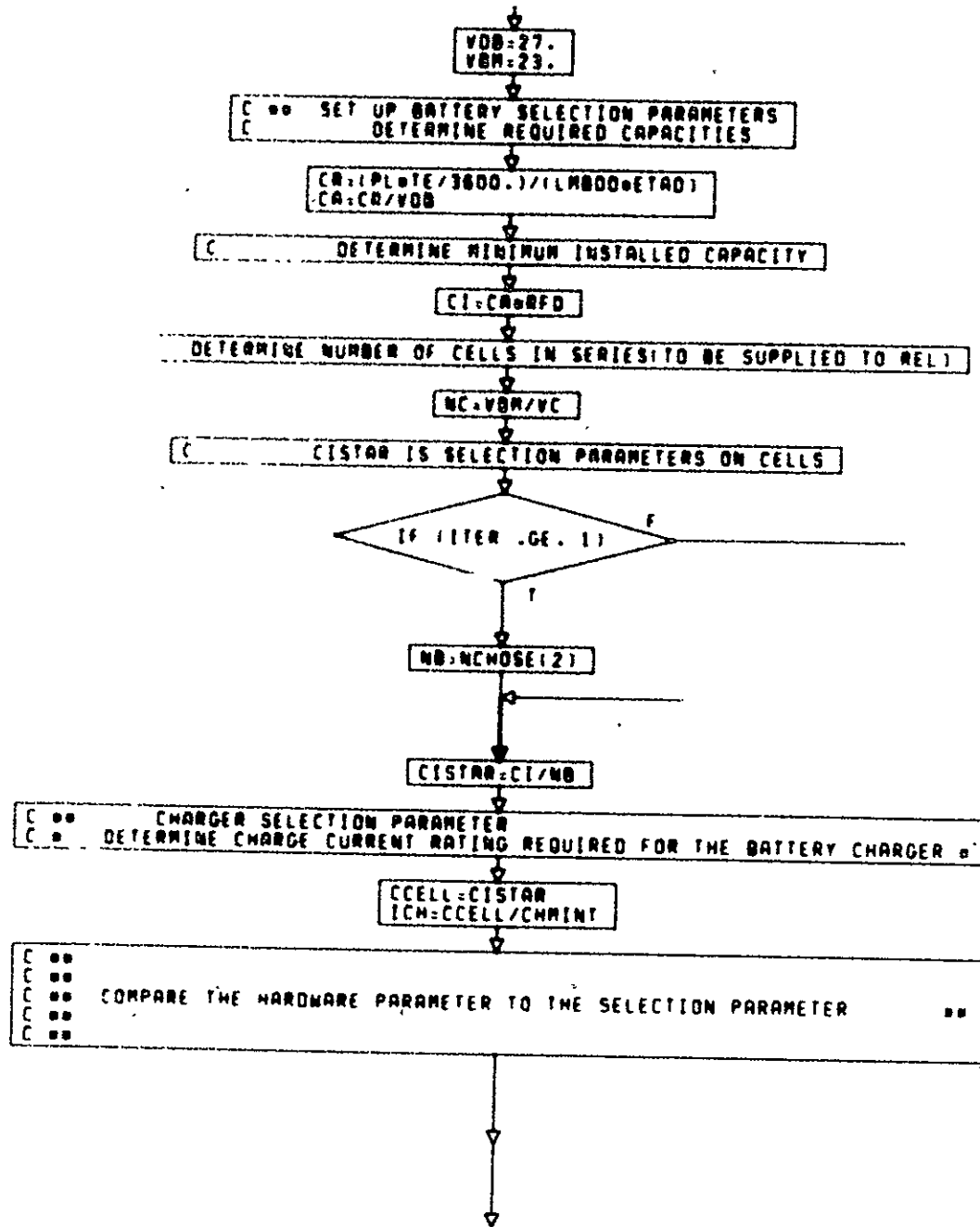
```

SET VOLTAGES FOR THIS DESIGN

```

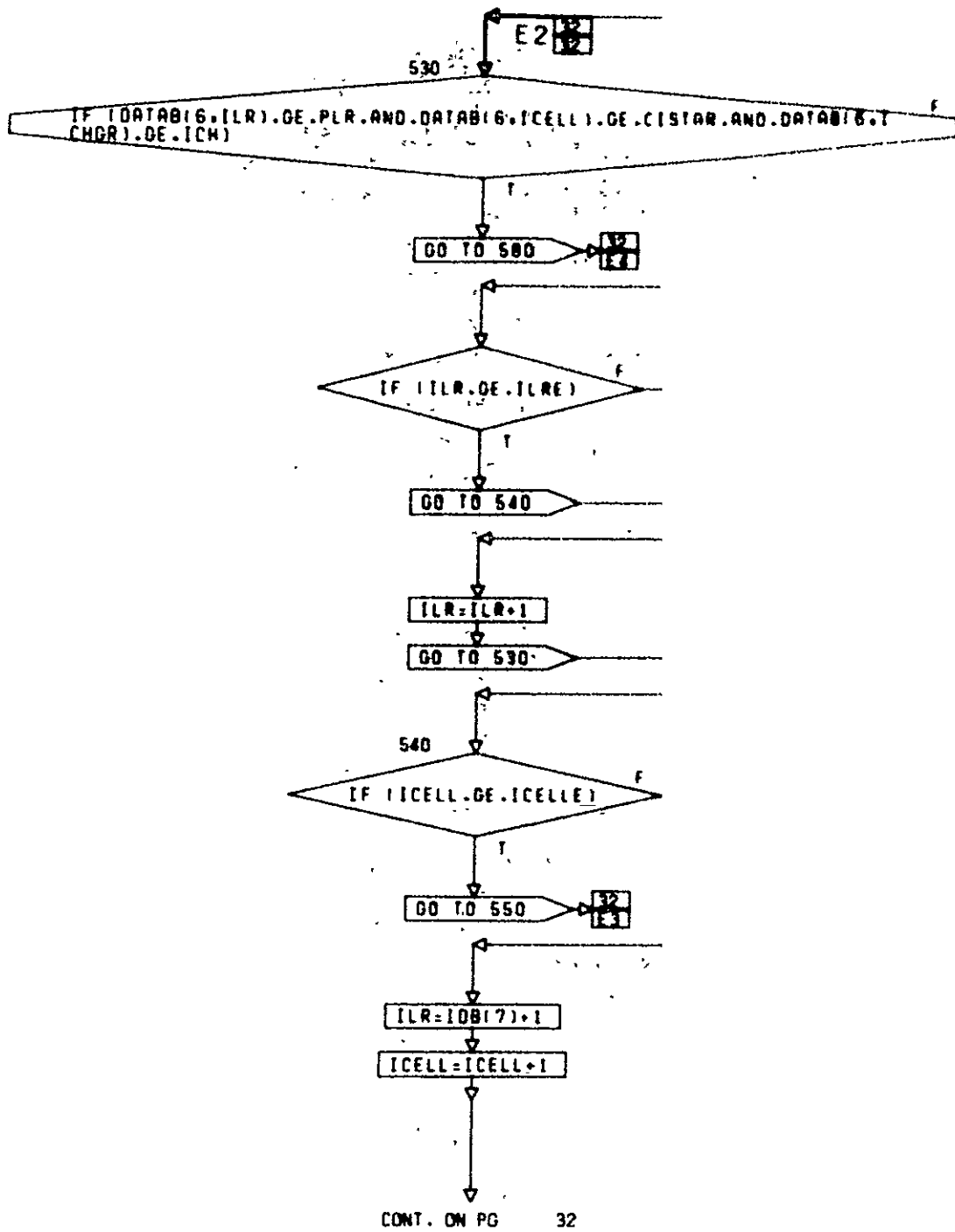
CONT. ON PG 30

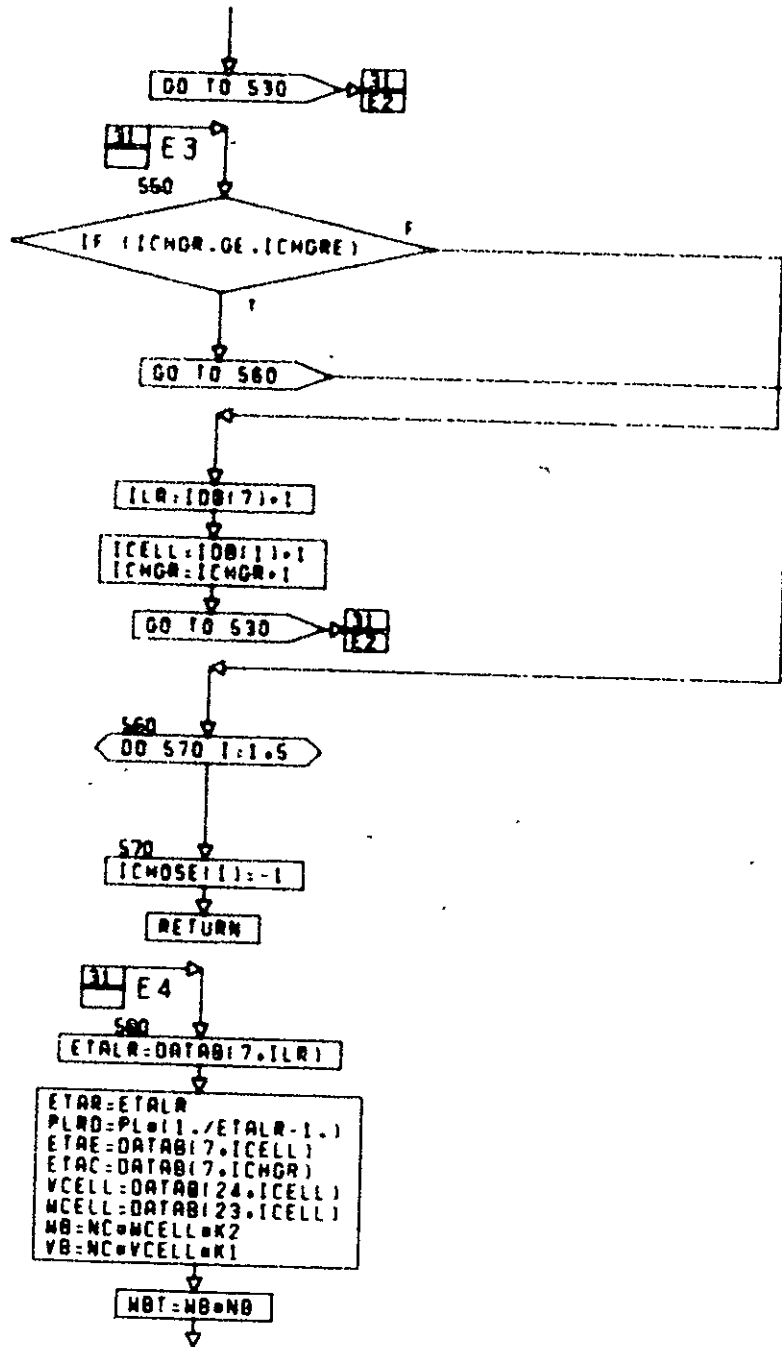
PG 28F 37



CONT. ON PG 31

PG 30F 37

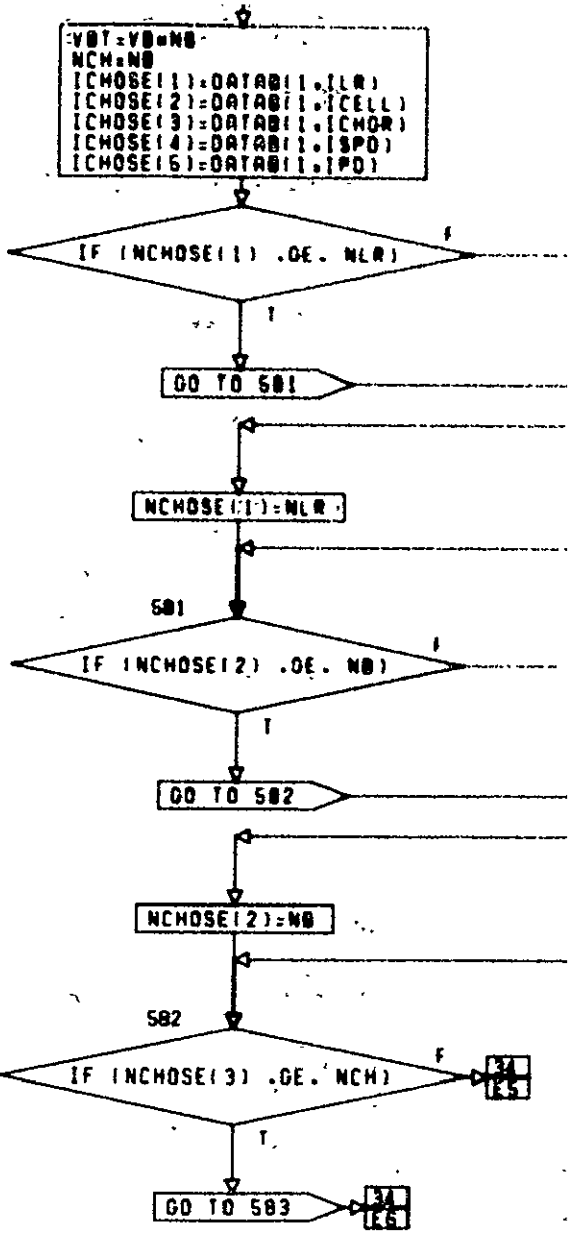




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OF POOR QUALITY

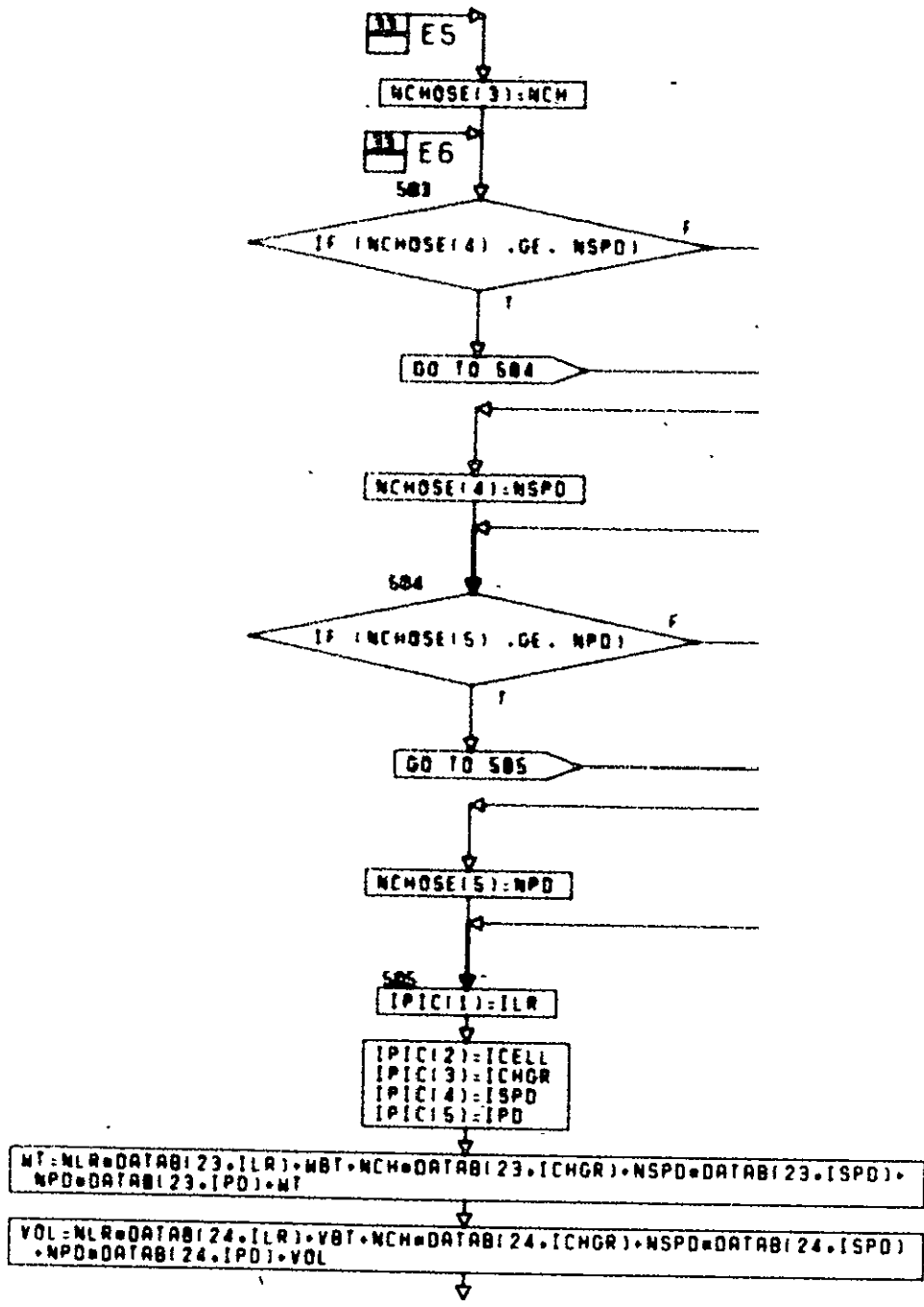
CONT. ON PG 33

PG 32F 37



CONT. ON PG 34

PG 30F 37



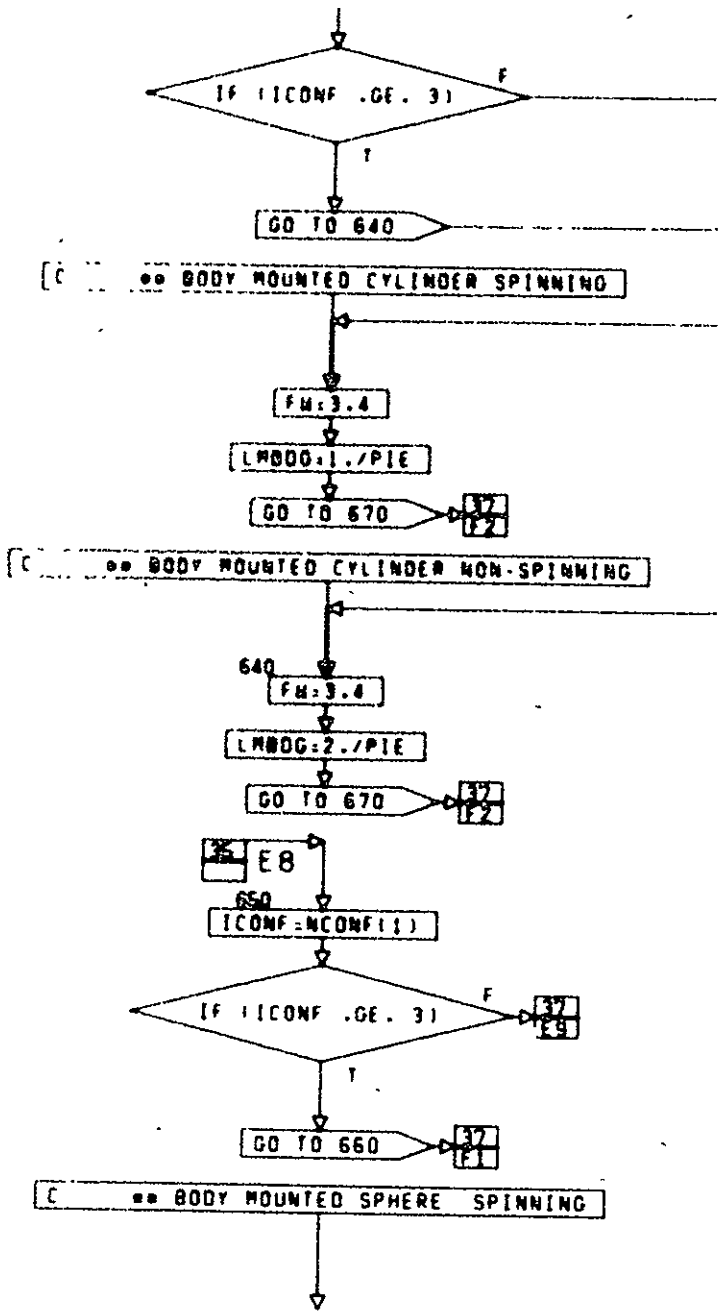
CONT. ON PG 35

PG 34F 37

ORIGINAL PAGE IS  
OF POOR QUALITY



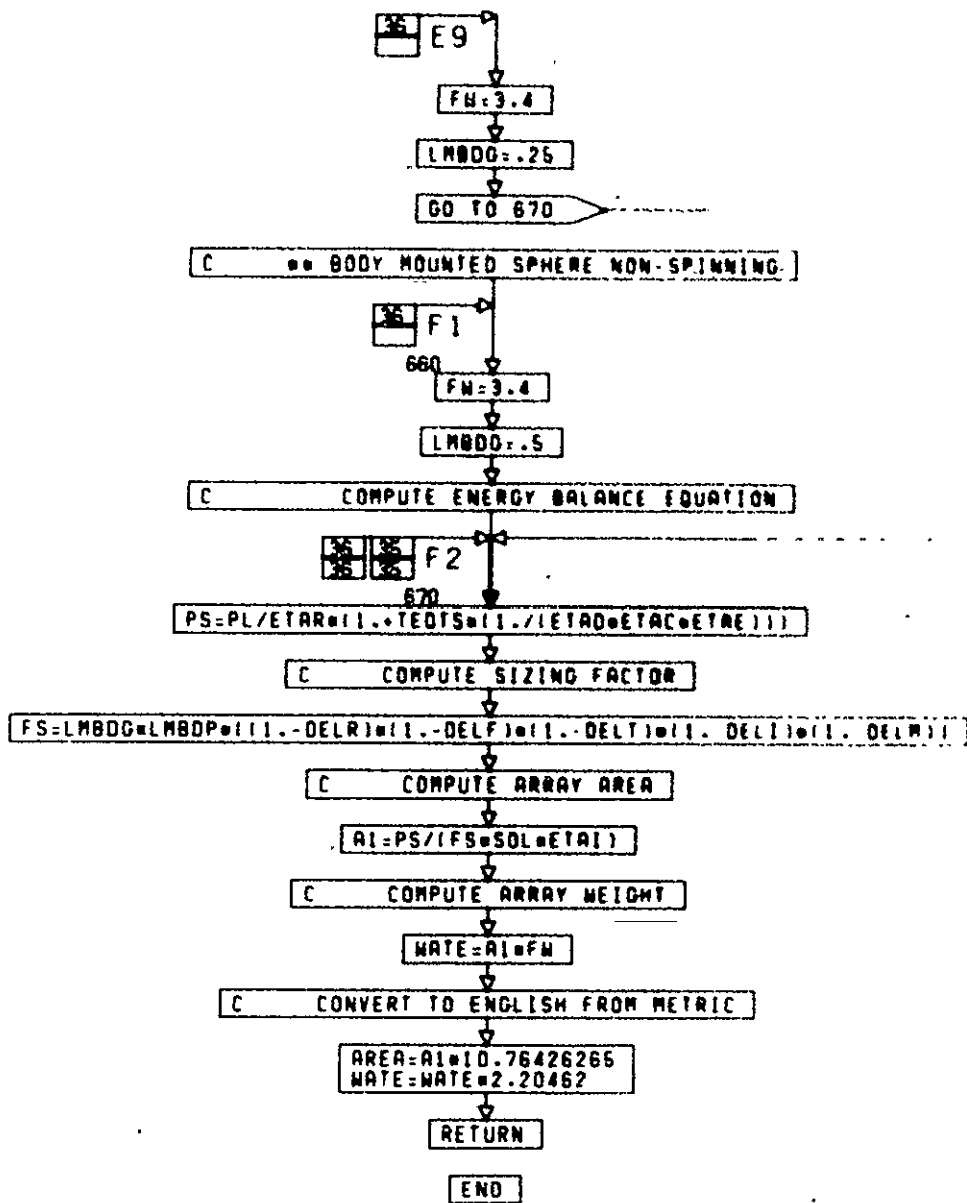




CONT. ON PG 37

PG 300F 37

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OF POOR QUALITY



SUBROUTINE AUXPROI(PIC, IERR, ITER, NCONF, ICHOSE, NCHOSE)  
 COMMON /USER2/TTWST, CLIFE

COMMON /BTM/WT, VOL, DT, D, DX, DY, DZ, XJ, YJ, ZJ, RJ, ACTHST, TOTIMP, PL,  
 PLMIN, LMBDD, AREA, SATLO, NATE, NC, ACSHP, WARMHT, IMCHHT, CONVHT, THWHT,  
 PASST, SATTWT, TPRIM, IOTLOC, RADA, RADAB, RAT, HTRPWA,  
 HTRPRB, HPT, HTPIPE, VCHP, HTP, FC, XNZERO, CONRT, ACSSH, @ITRAT(2),  
 EQBLG, SABLG, SATHT

COMMON /USER1/EQM1WT, EQM2WT, DIAMAX, ALI  
 COMMON /DBCOM/IOB(30), DATA(55,90)

DIMENSION (PIC(9), NCONF(6), ICHOSE(14), NCHOSE(14),  
 IACPT(20))

DIMENSION N(14)  
 DATA XMR/1.5/

IF(NCONF(2).GT.1)

GO TO 30

C THIS IS COLD GAS CONFIGURATION  
 C DETERMINE MAXIMUM THRUST FROM SANDC

FMAX = AMAX(IACTHST, TTWST)

IF(FMAX.LT.50..AND.TOTIMP.LT.5000.)

GO TO 1

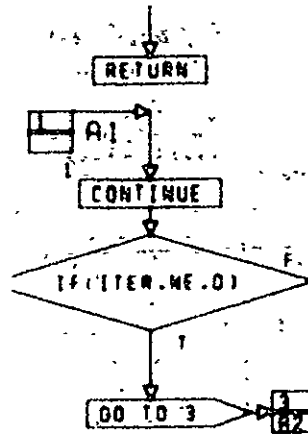
C THIS IS NOT AN ACCEPTABLE CONFIGURATION

ICHOSE(1) = -1

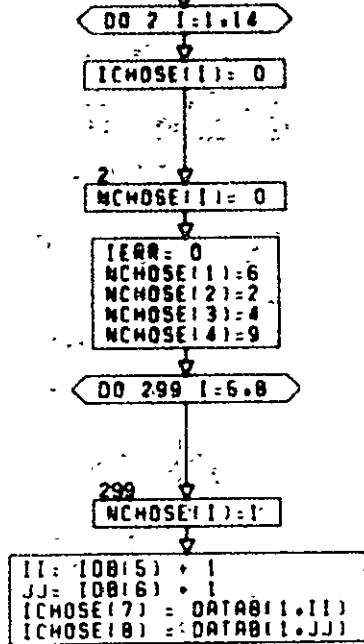
CONT. ON PG 2

PG 1 OF 61

ORIGINAL PAGE IS  
 OF POOR QUALITY

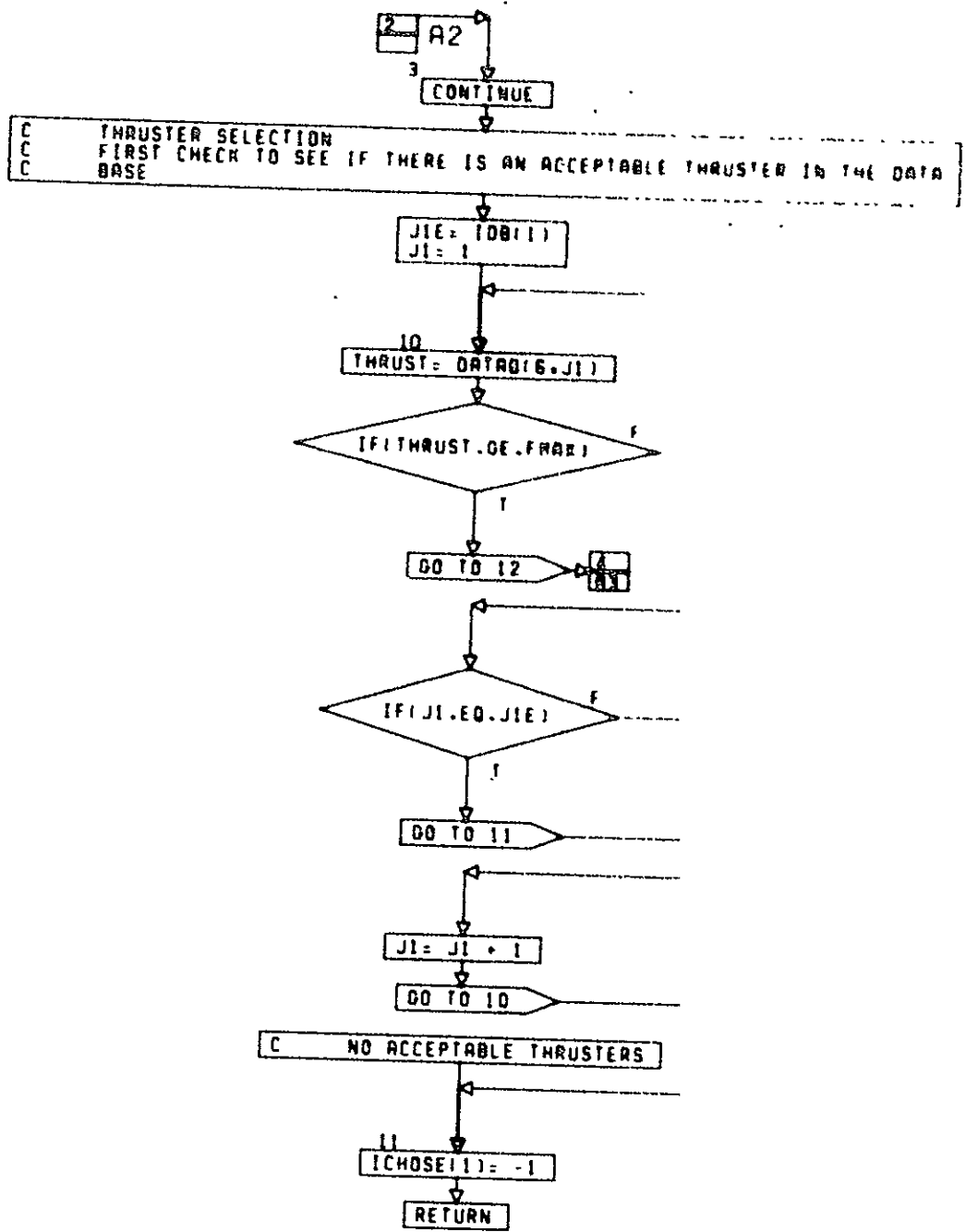


INITIALIZE ICHOSE, NCHOSE, IERR AND SELECT HARDWARE NOT SIZED  
 I.E., THE FILL AND VENT VALVE AND RELIEF VALVE



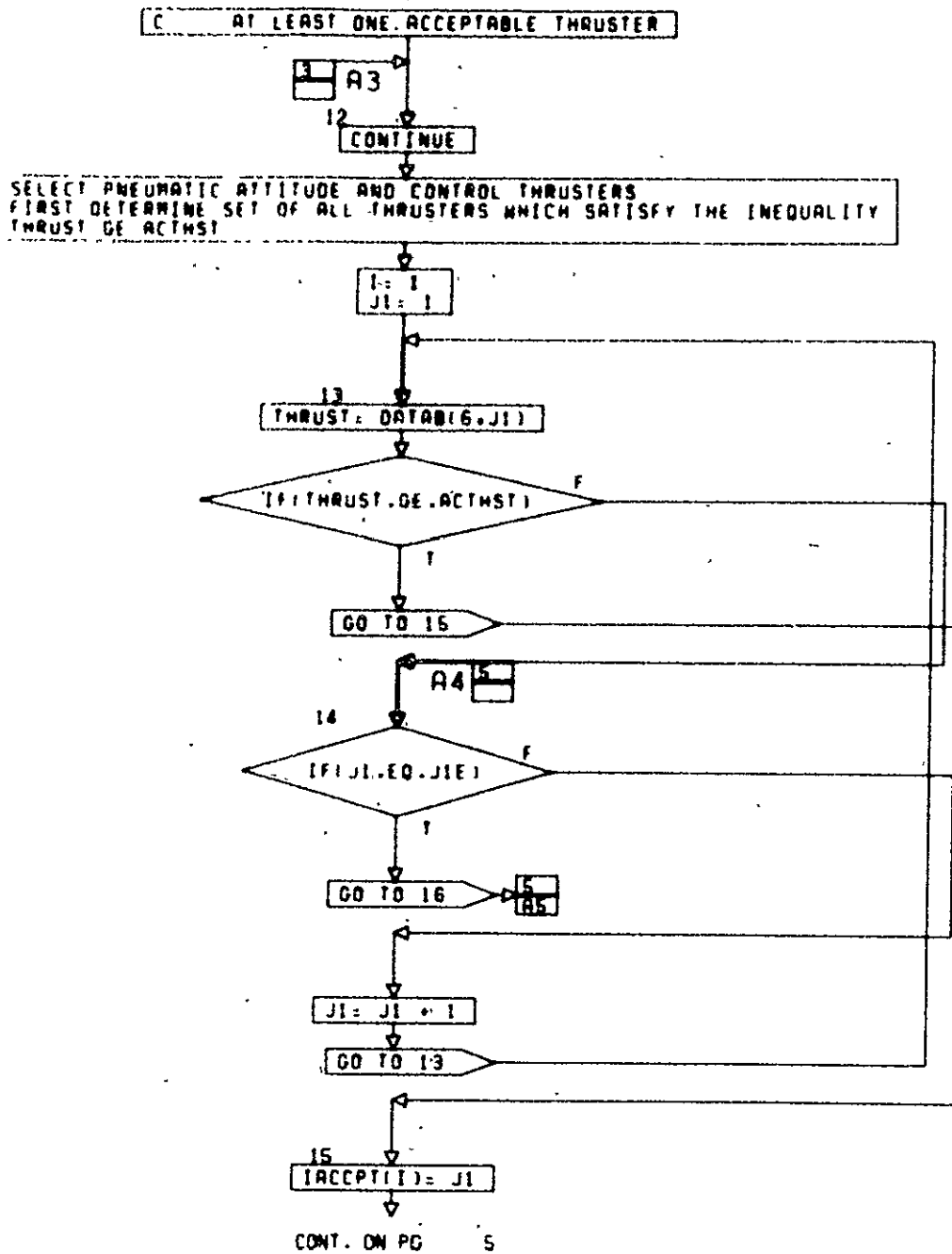
CONT. ON PG 3

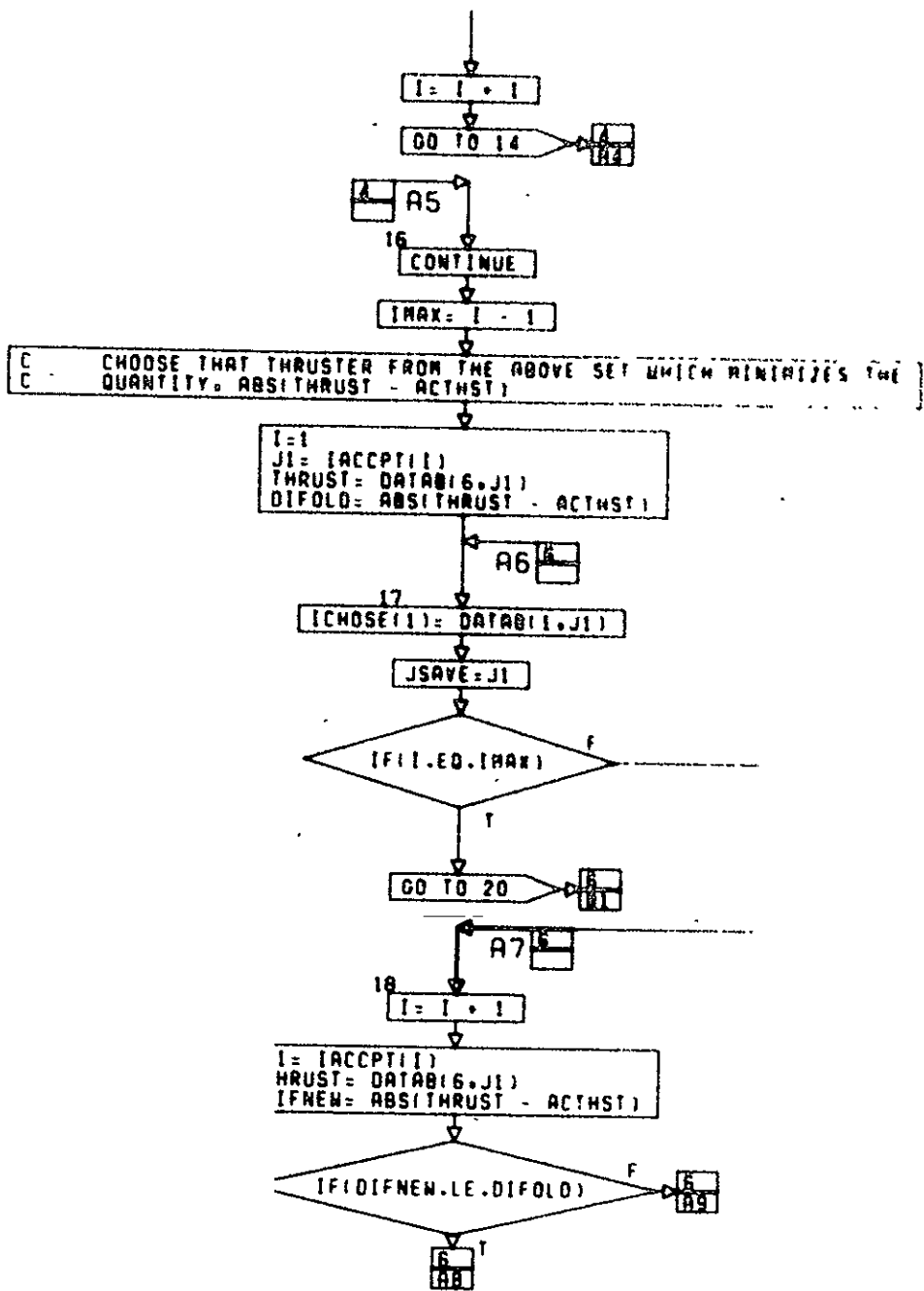
PG 2 OF 61



CONT. ON PG 4

PG 3 OF 61

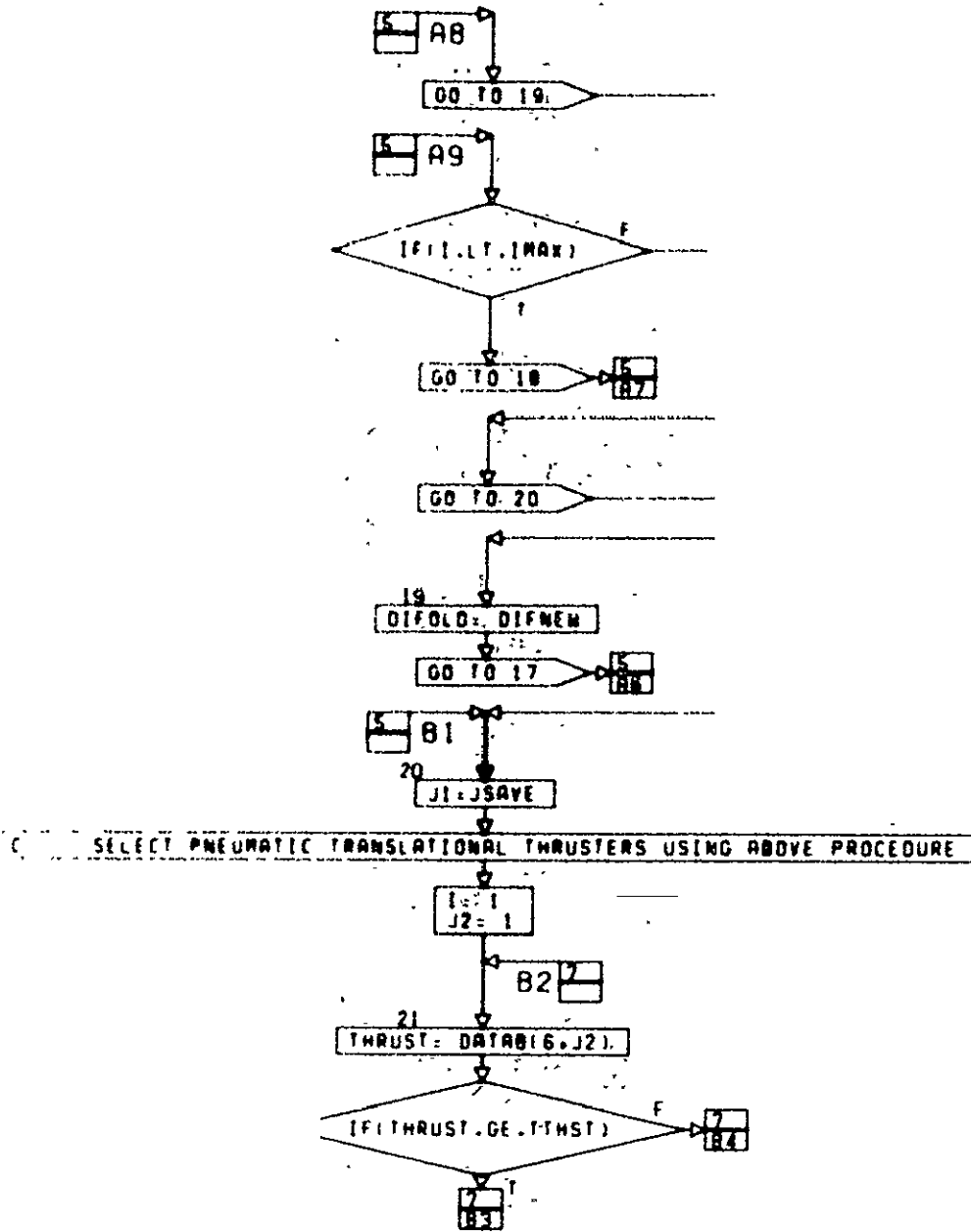




CONT. ON PG 6

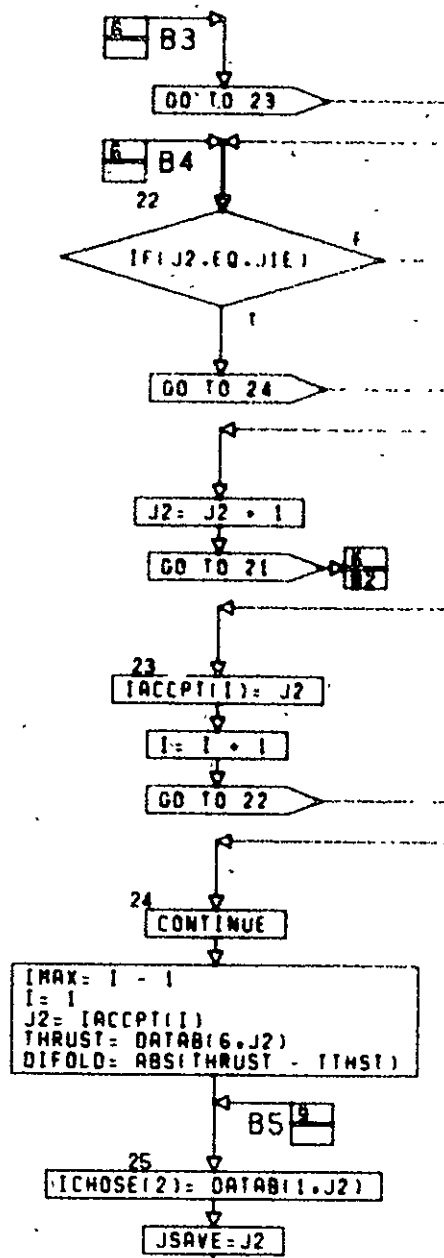
PG 5 OF 61





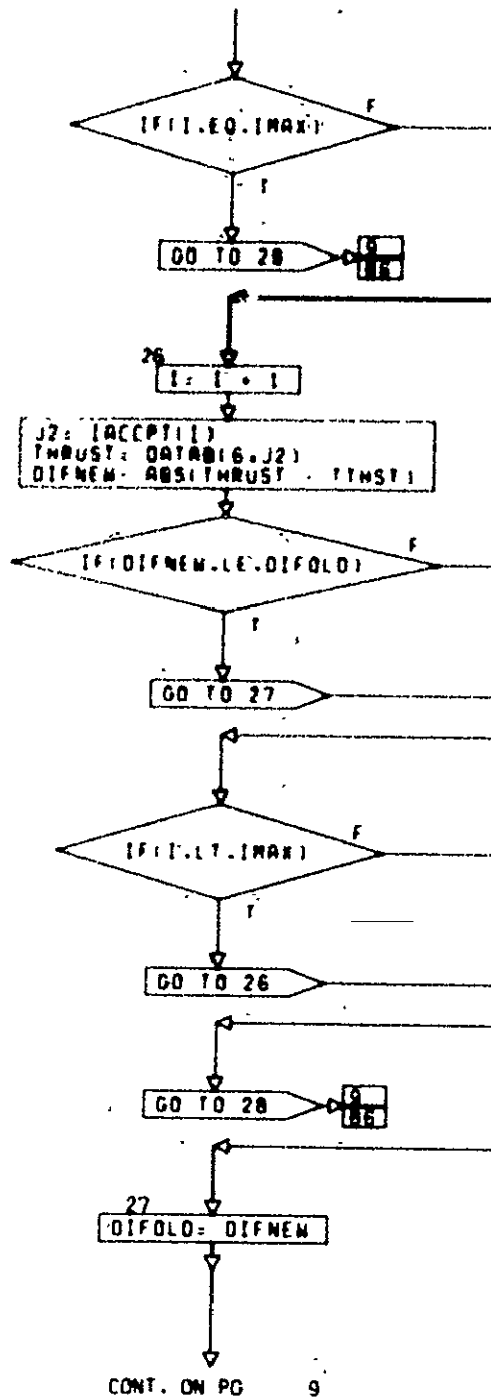
CONT. ON PG 7

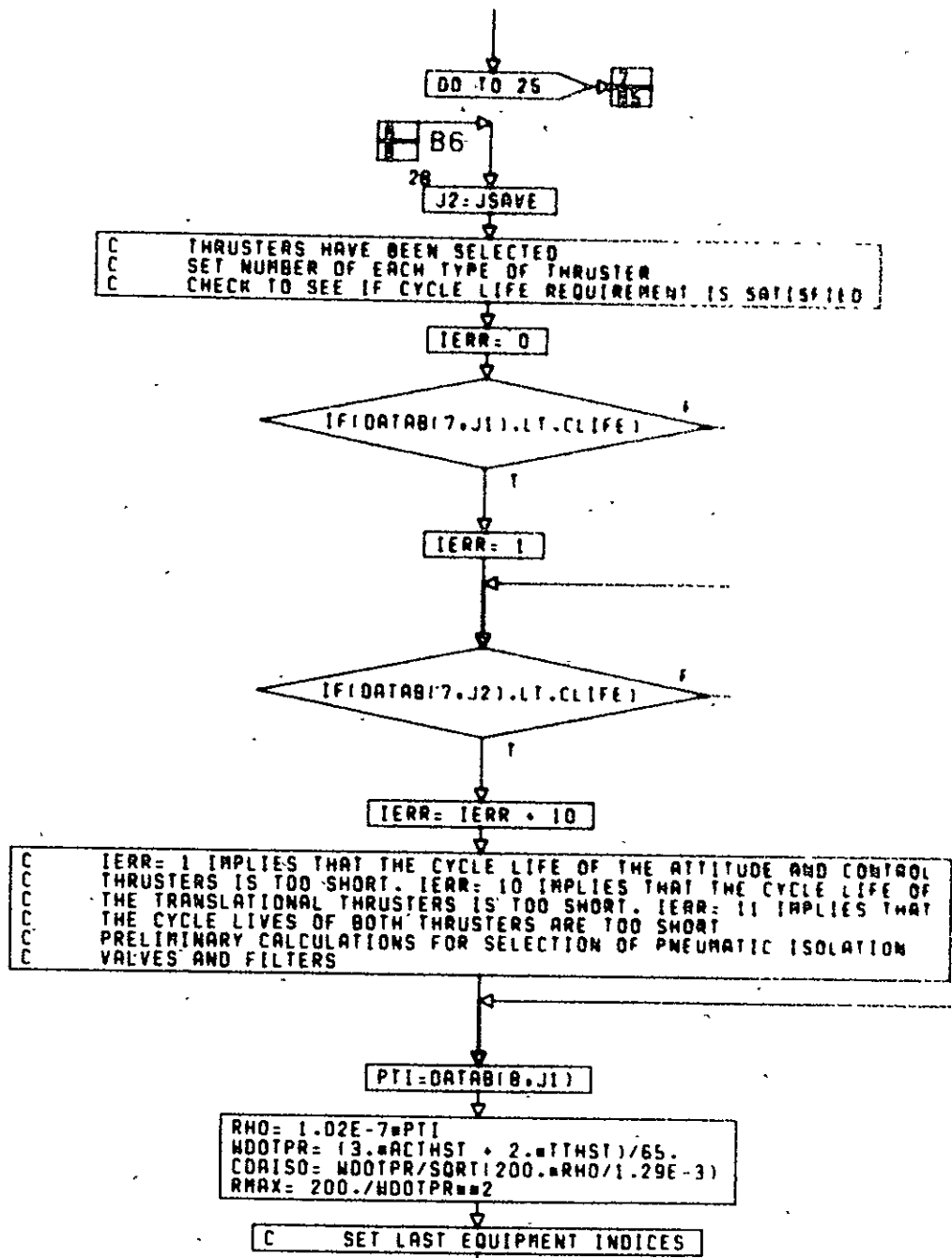
PG. 6 OF



↓  
CONT. ON PG 8

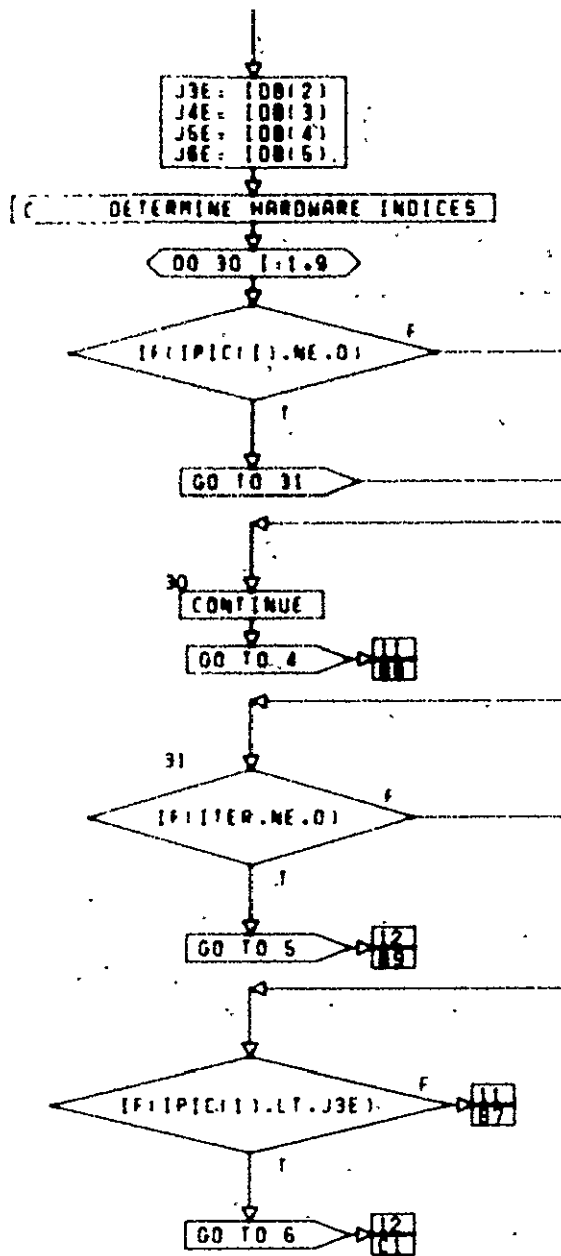
PG. 7 OF

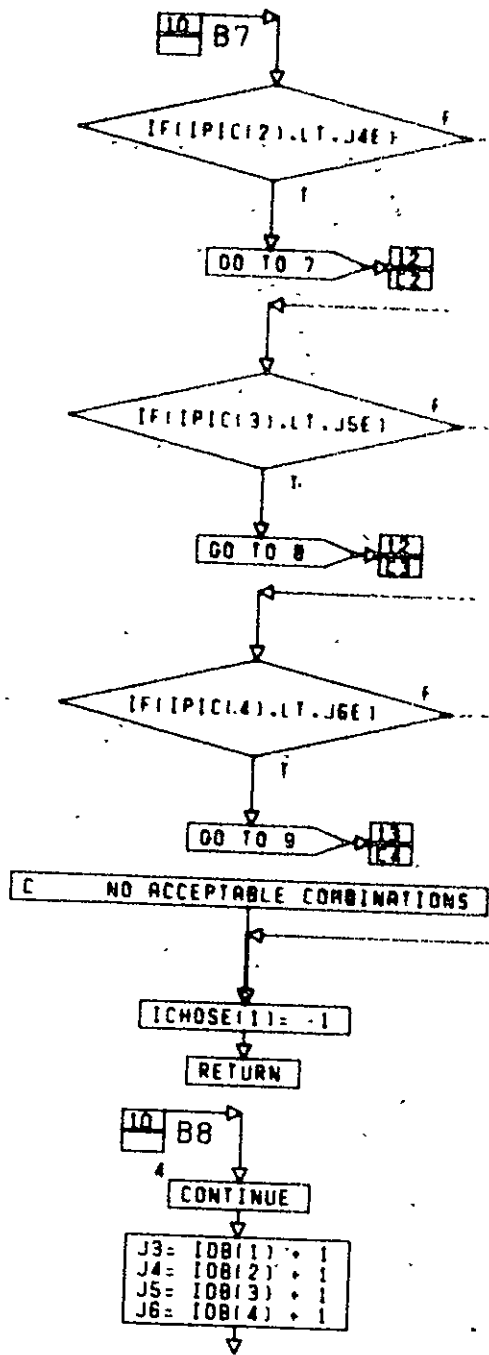




CONT. ON PG 10

PG 9 OF 61

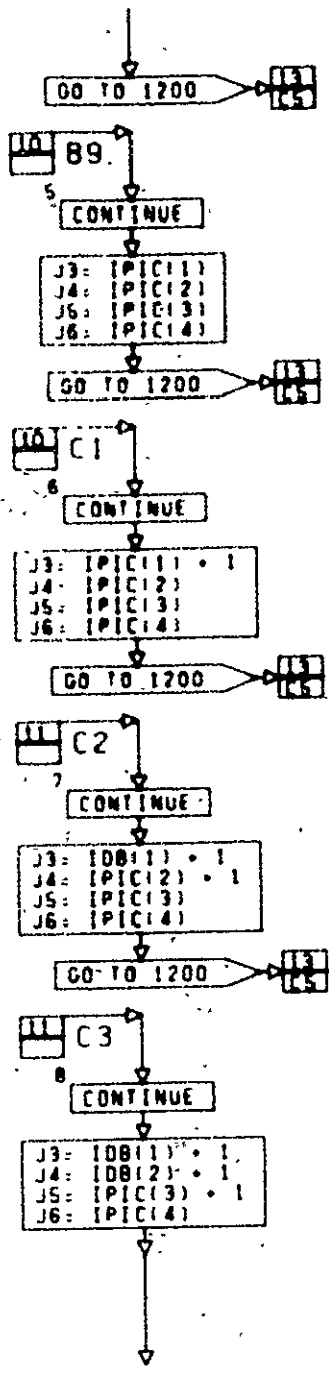




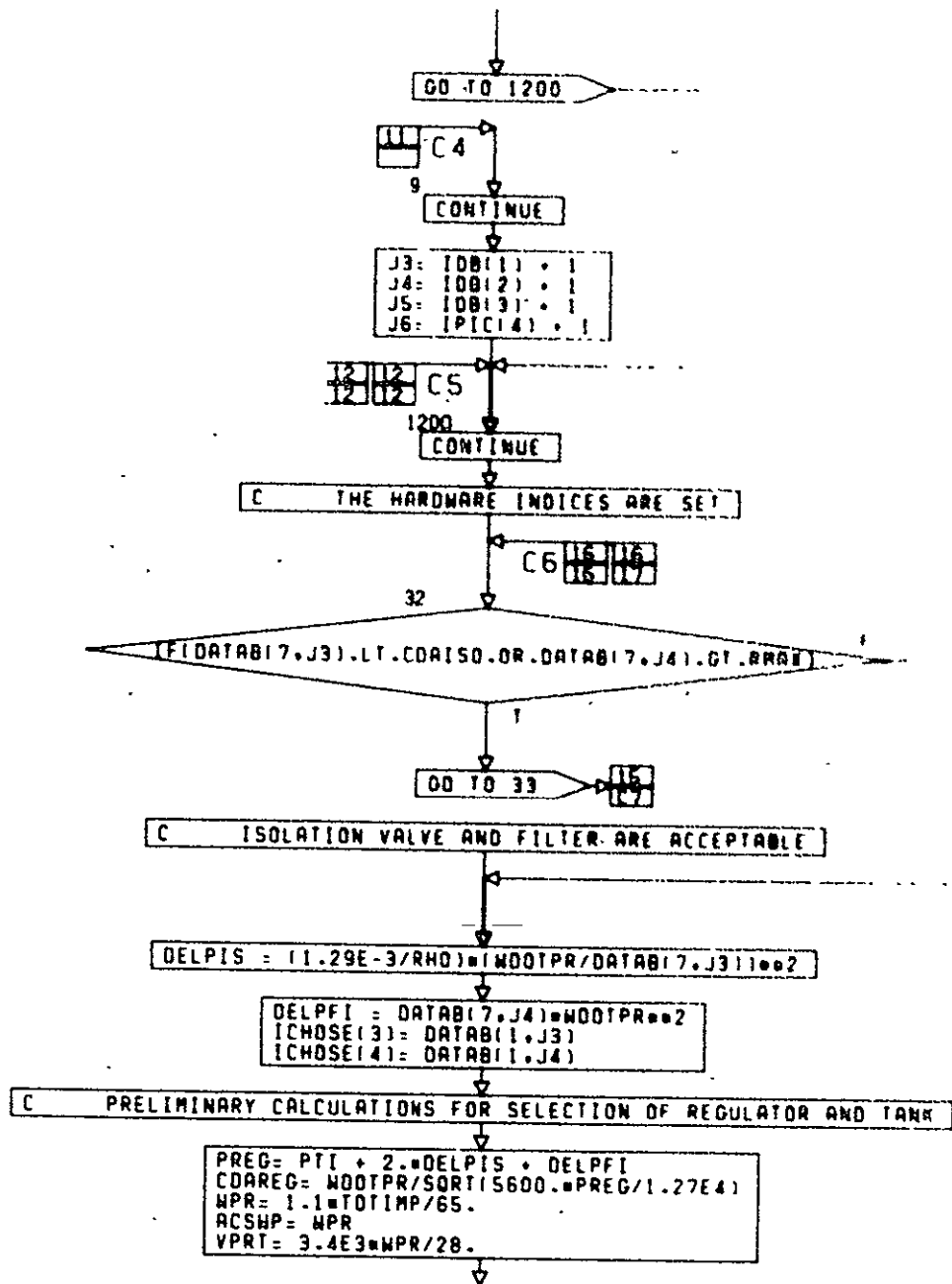
CONT. ON PG 12

PG 1 OF 61

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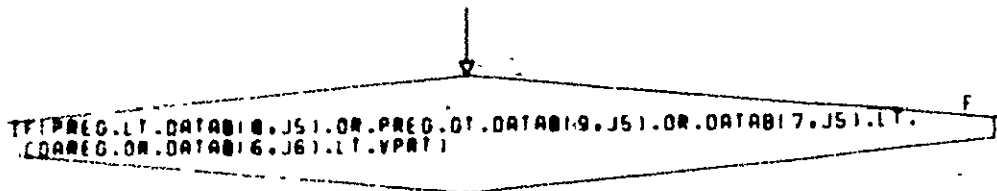
CONT. ON PG 13



CONT. ON PG 14

PG 15F 61





GO TO 33

REGULATOR AND TANK ARE ACCEPTABLE

[CHOSE16]: DATAB11.J5)

[CHOSE16]: DATAB11.J61  
TMM7: DATAB123.J6)

SIZE PLUMBING AND CONNECTORS

PCMATE = .2#DATAB123.J6)

STORE LAST INOICES ACCEPTABLE

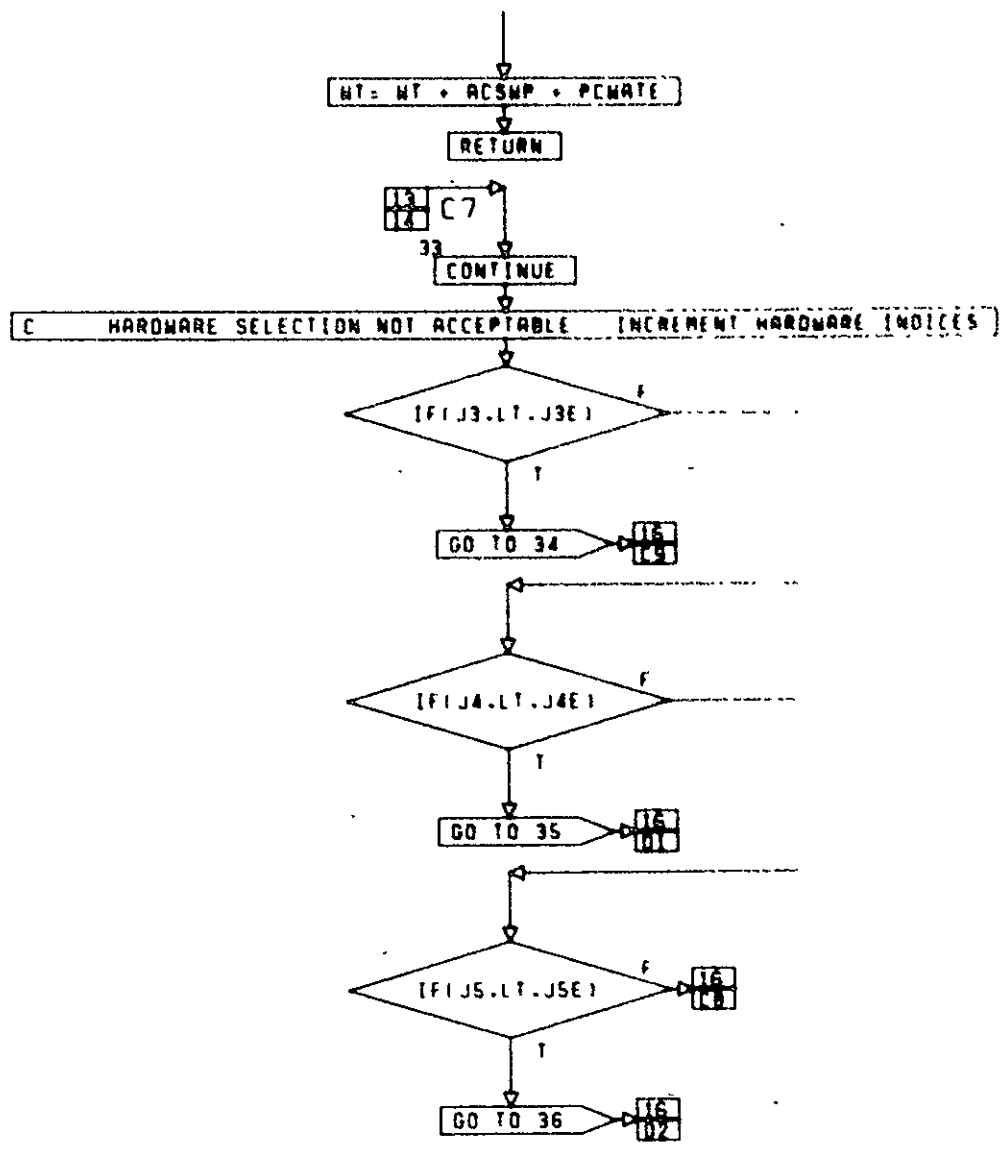
IPIC11): J3  
IPIC12): J4  
IPIC13): J5  
IPIC14): J6  
NI7): J1  
NI8): J2  
NI11): J1  
NI2): J2

NI3): J3  
NI4): J4  
NI5): J5  
NI6): J6

DO 322, I=1,0

J: NI I)  
MT: MT + NCHOSEI I)#DATAB123.J)  
VOL: VOL + NCHOSEI I)#DATAB124.J)  
PL: PL + NCHOSEI I)#DATAB116.J)  
PLMIN: PLMIN + NCHOSEI I)#DATAB118.J)

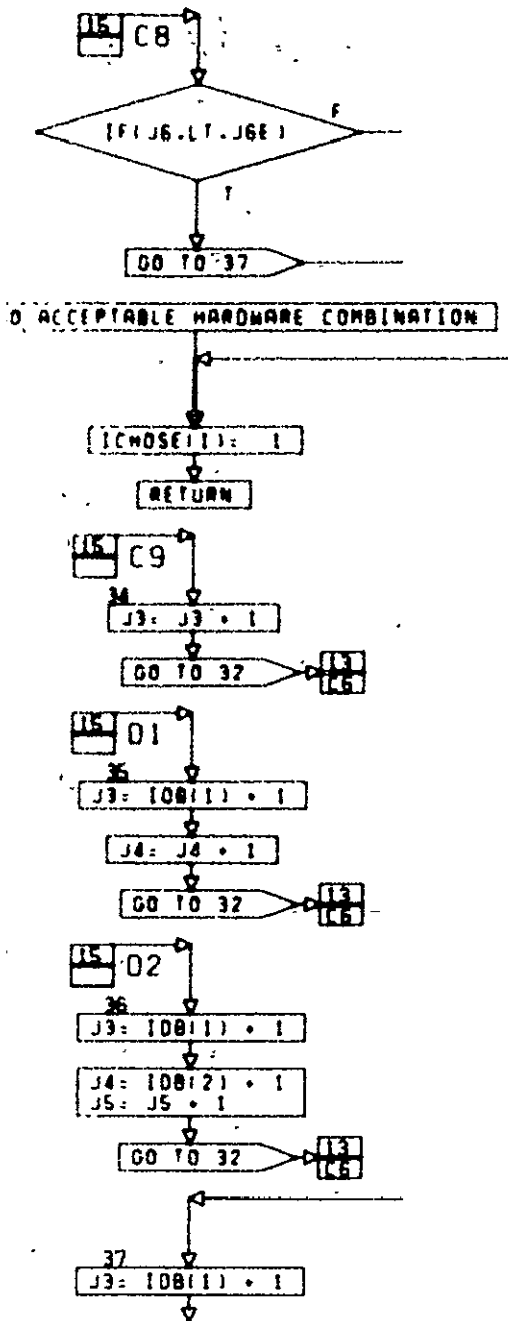
CONTINUE



CONT. ON PG 16

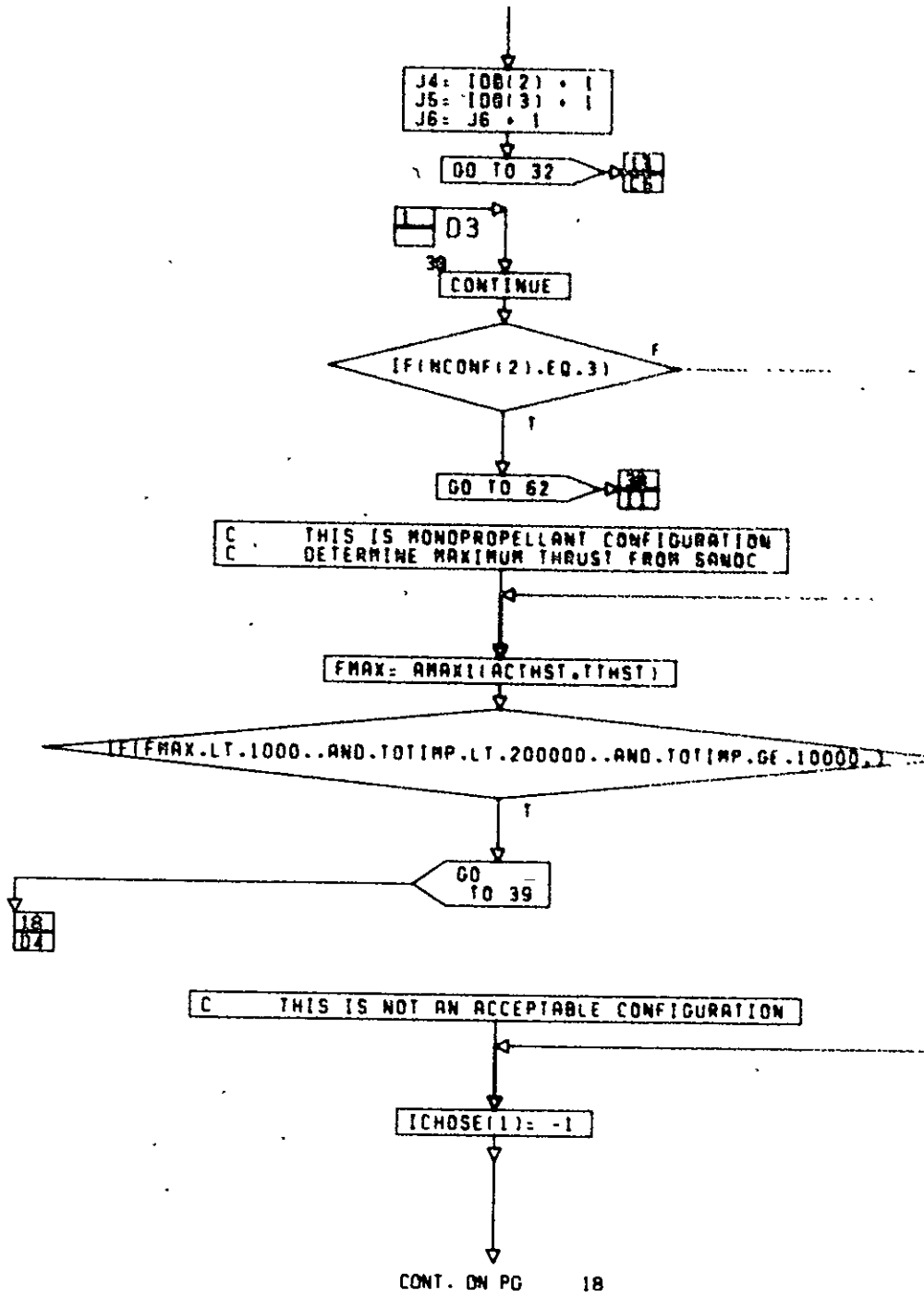
PG 15 OF 61

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CONT. ON PG 17

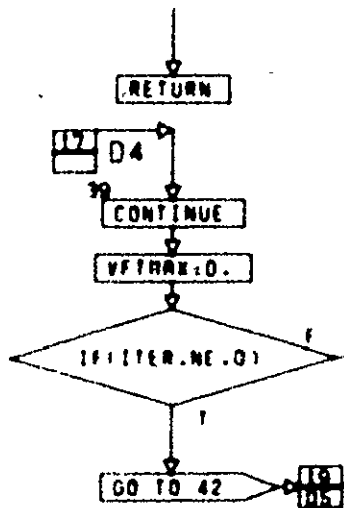
PG 100E



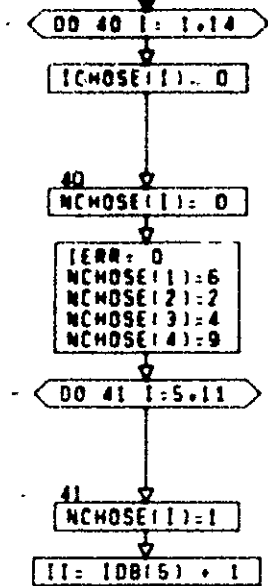
CONT. ON PG 18

PG 17F

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OF POOR QUALITY

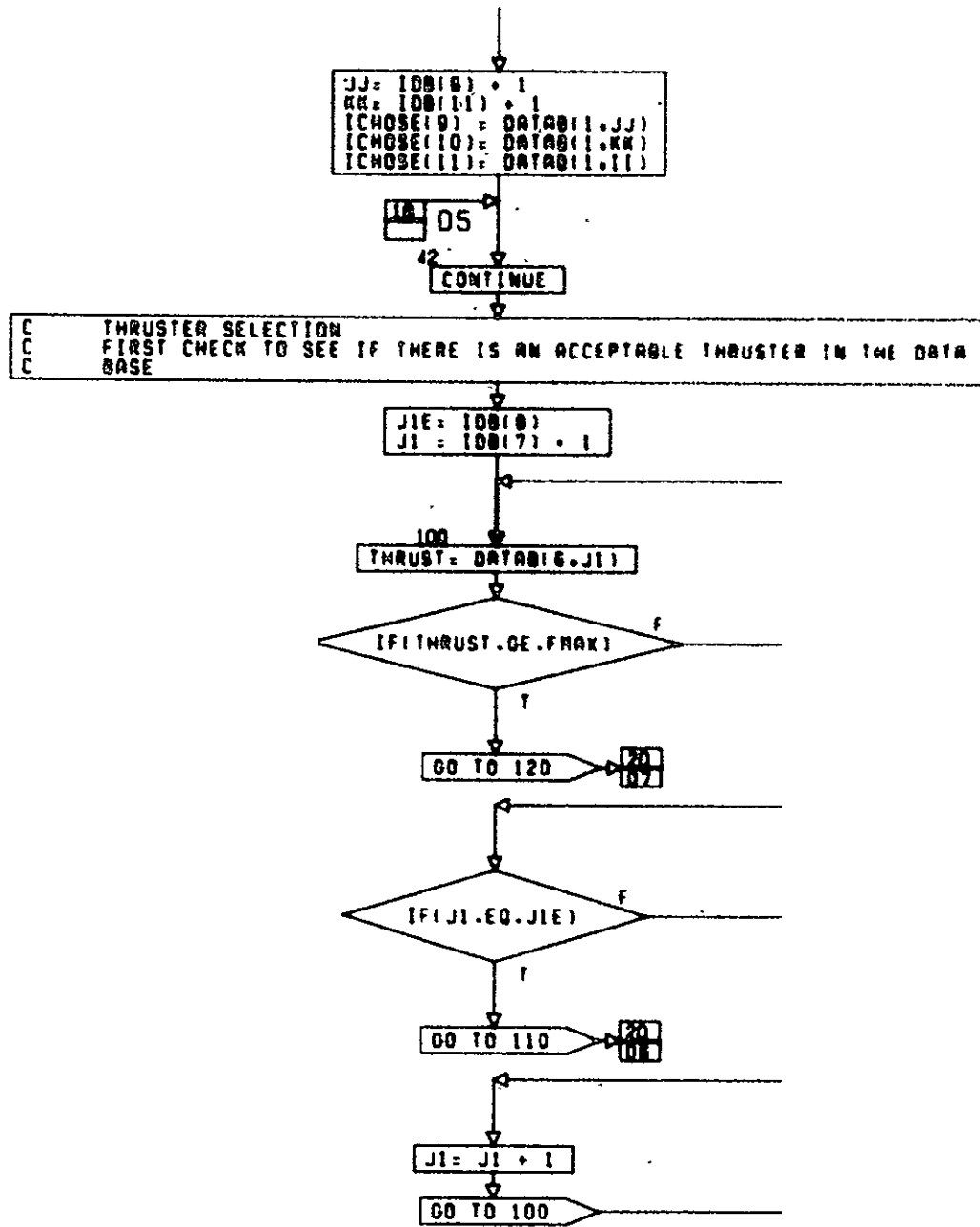


C INITIALIZE ICMOSE,NCMOSE,IEAR AND SELECT HARDWARE NOT SIZED  
 C I.E., THE BELIEF VALVE,FILL AND VENT VALVE AND FILL AND DRAIN  
 C VALVE



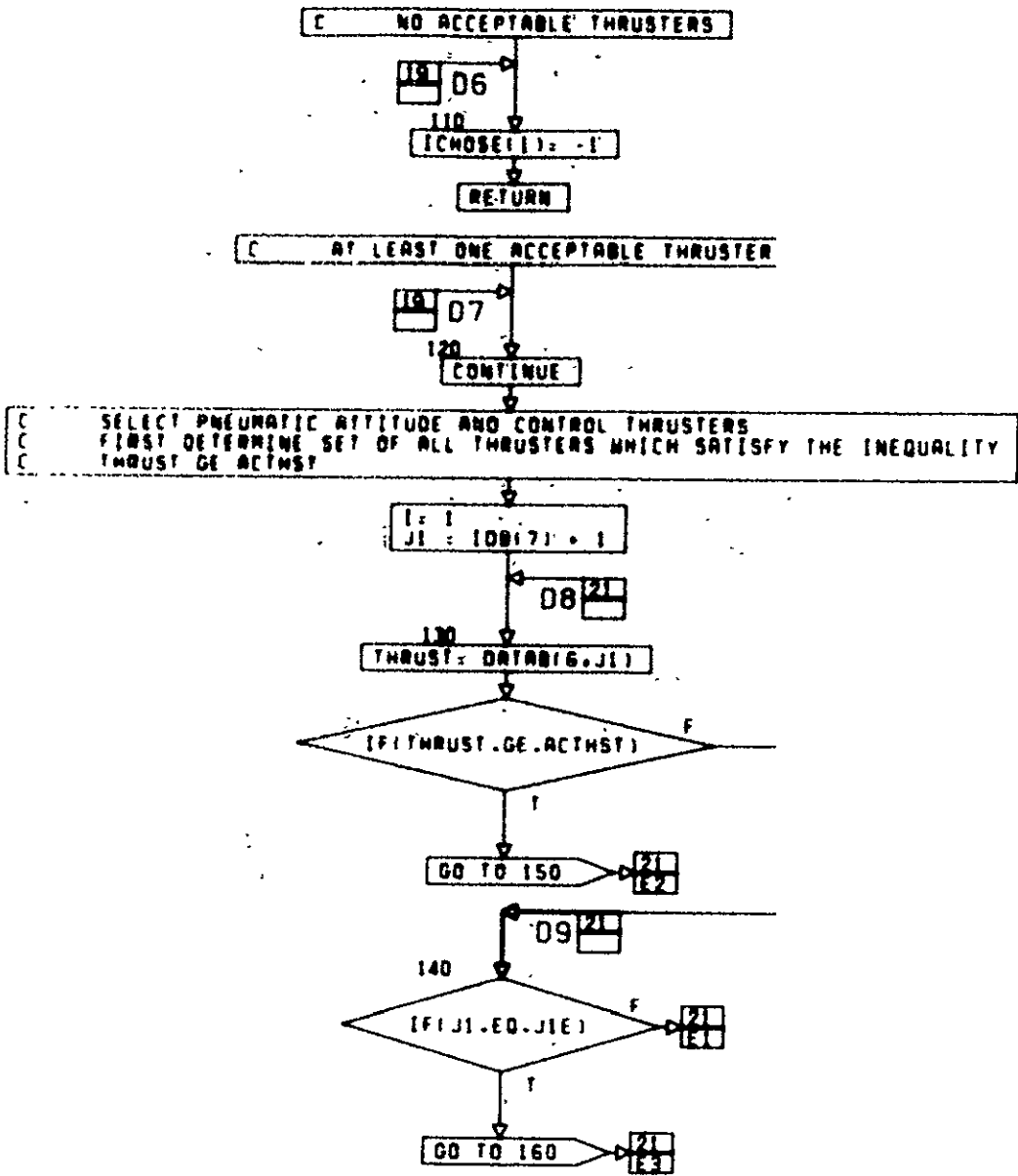
CONT. ON PG 19

PG 100F 61



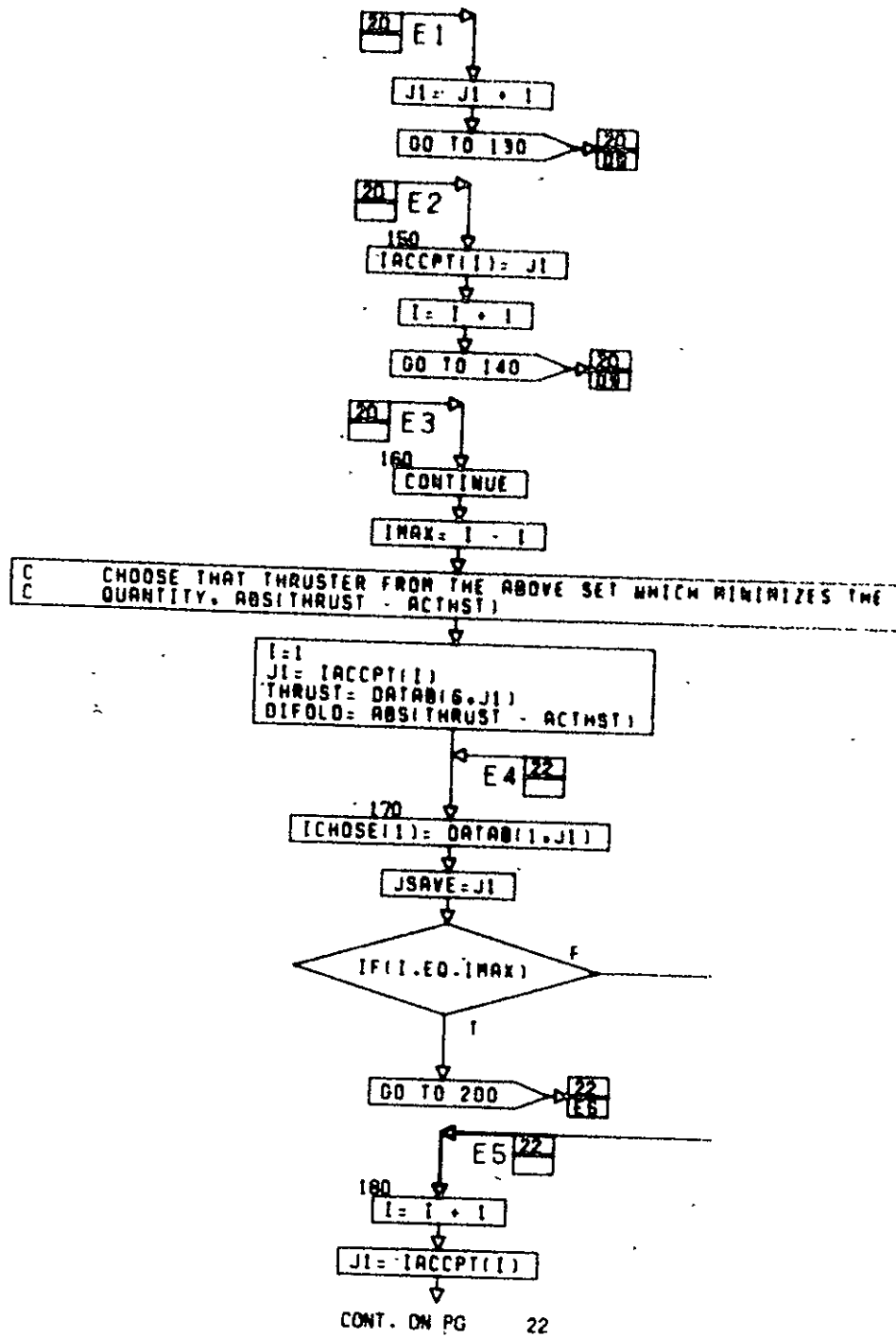
CONT. ON PG 20

PG 19F 61

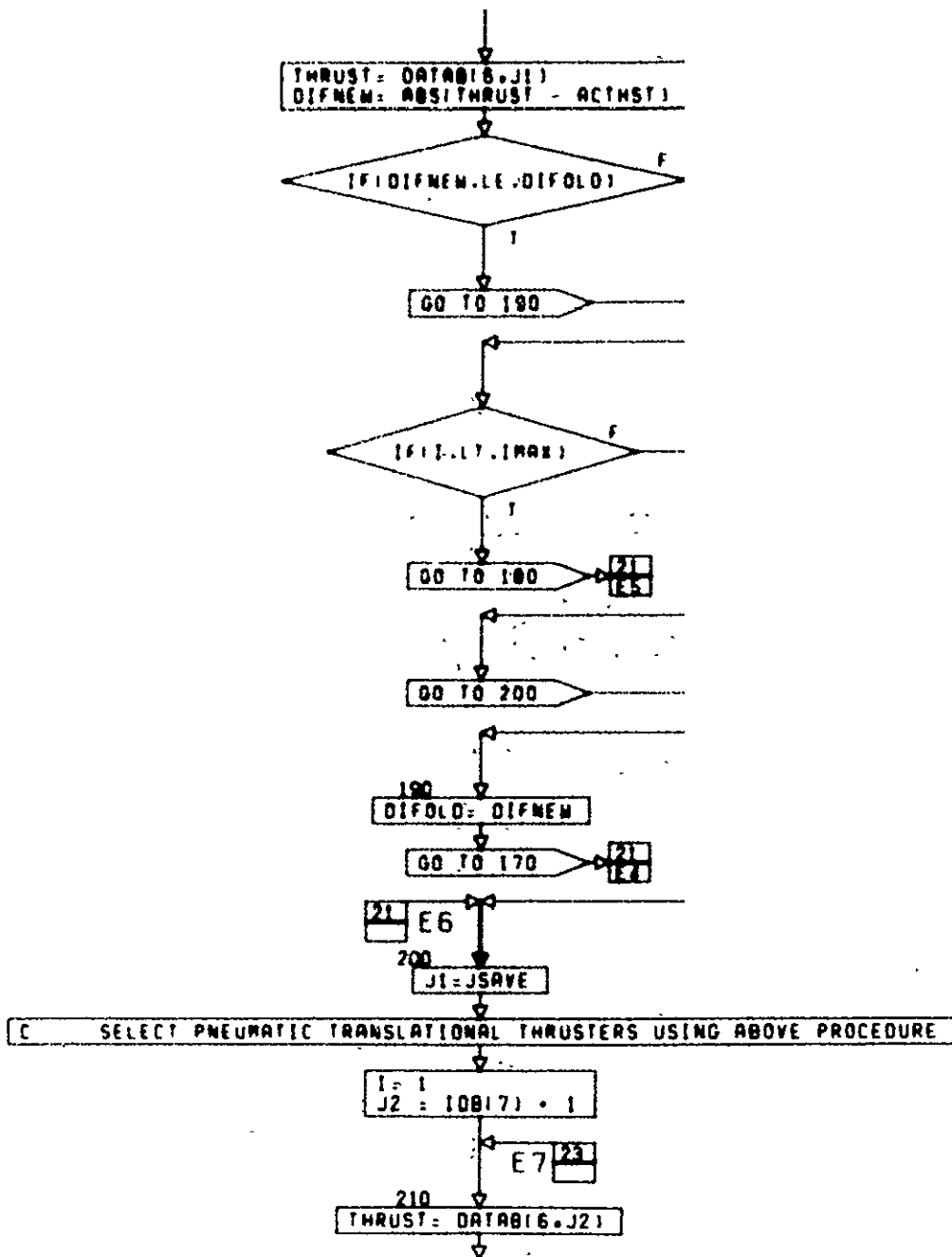


CONT. ON PG 21

PG 20 OF 61

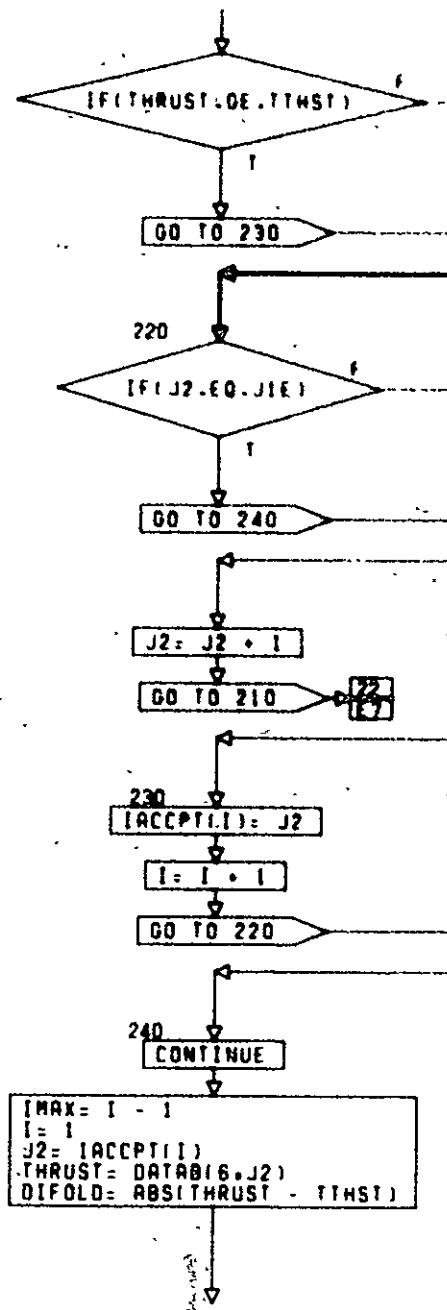






CONT. ON PG 23

PG 22F 61

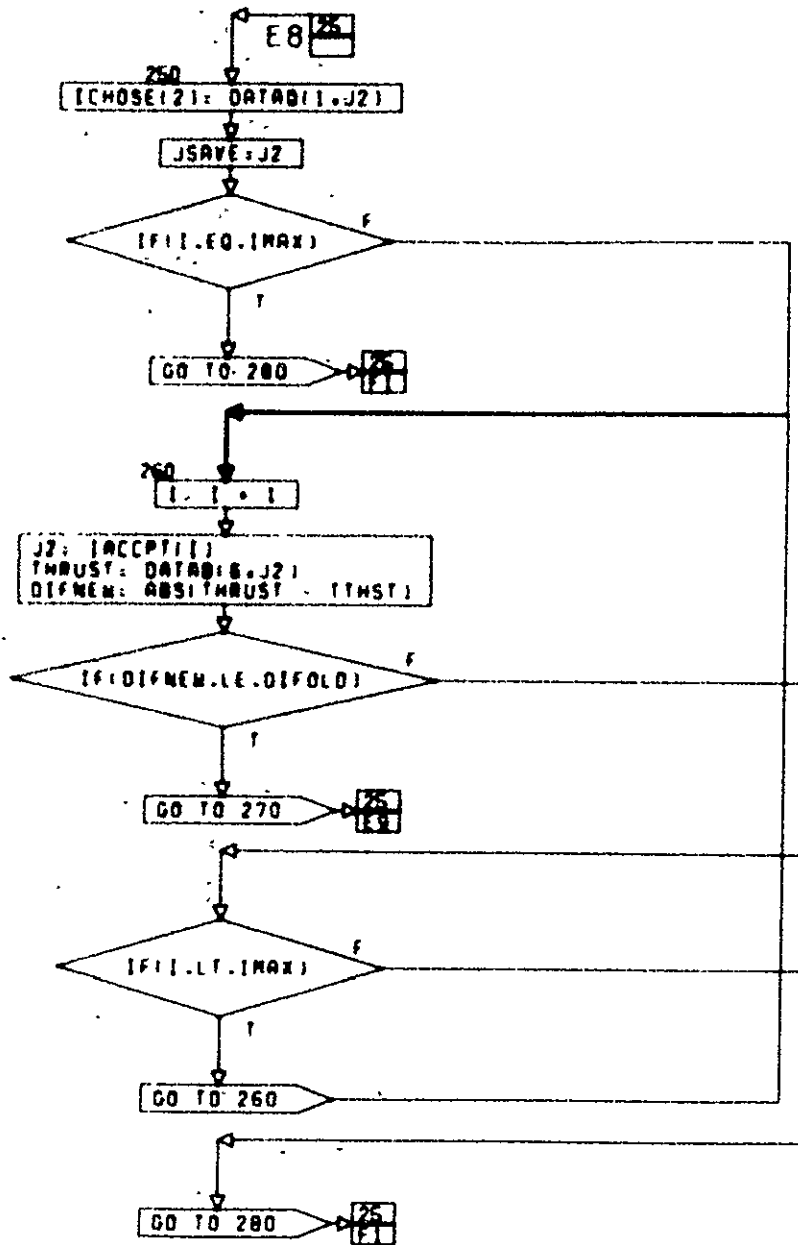


CONT. ON PG 24

PG 20F 61

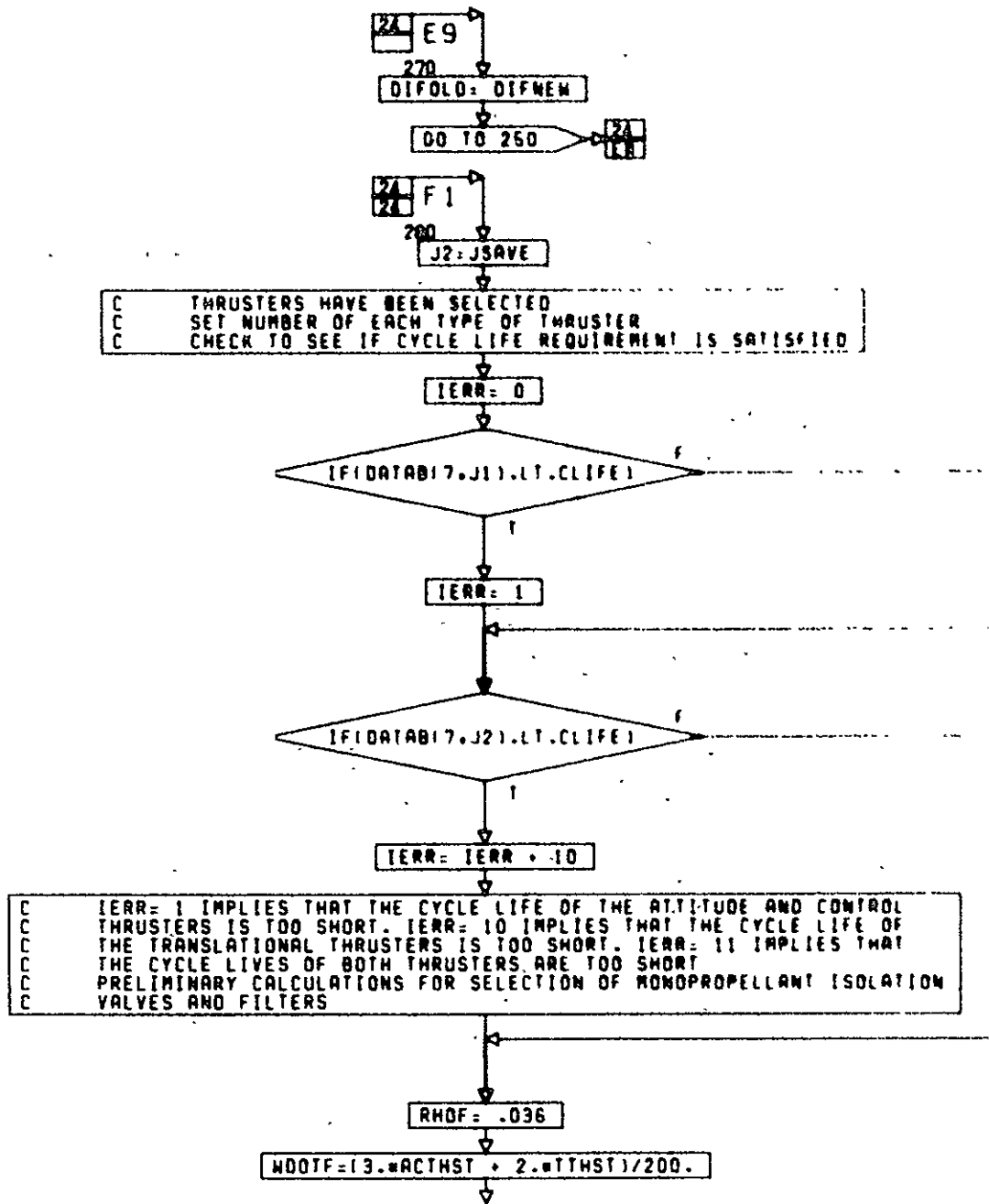
ORIGINAL PAGE IS  
OF POOR QUALITY

10-275



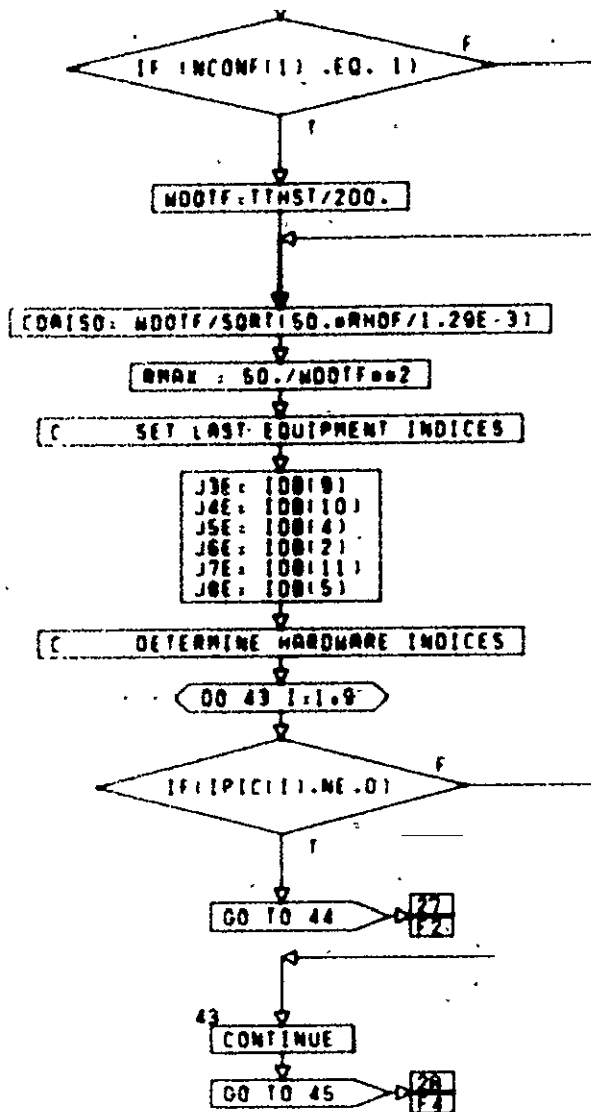
CONT. ON PG 25

PG 24 OF 61



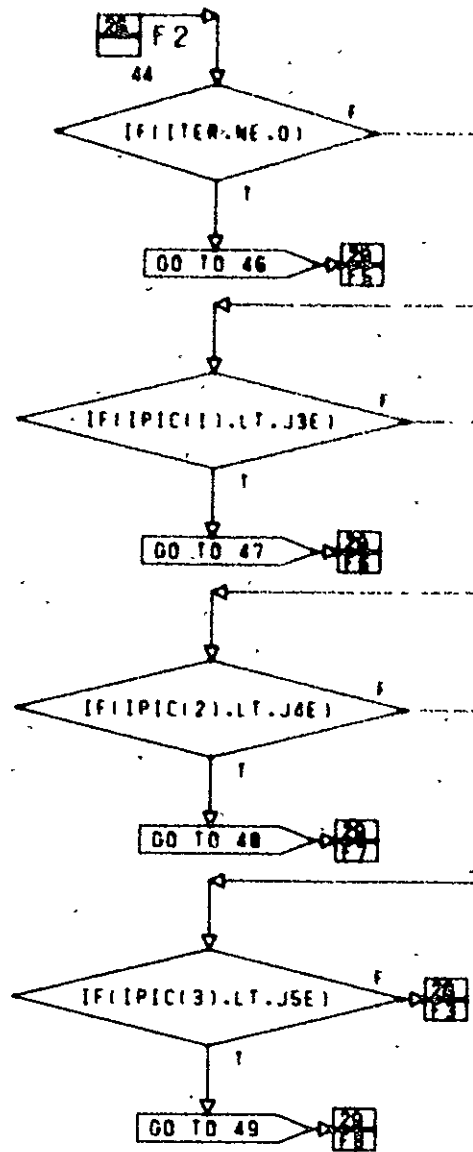
CONT. ON PG 26

PG 25OF 61



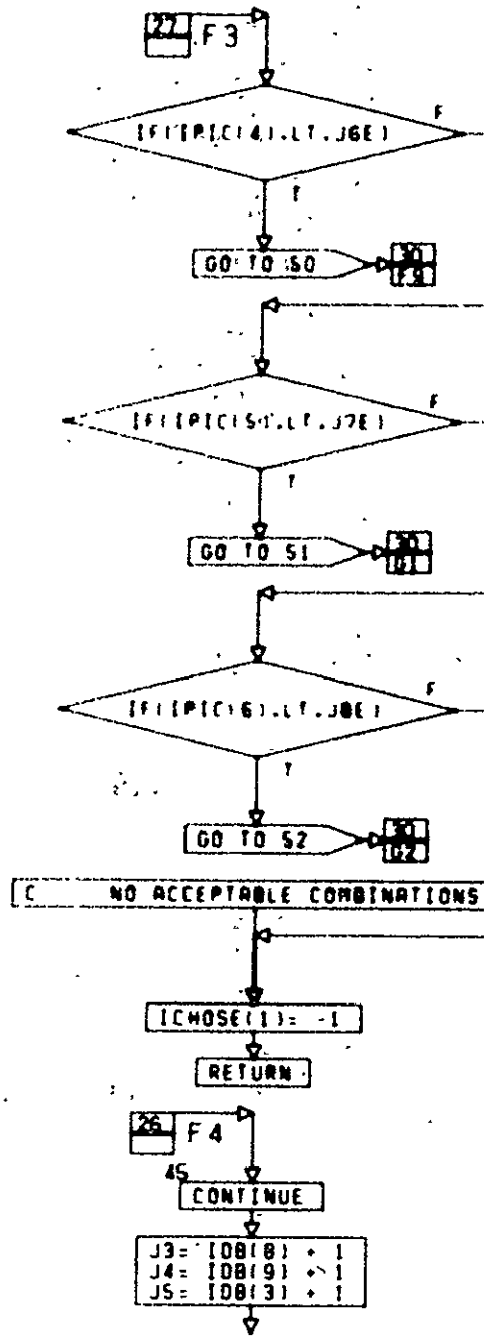
CONT. ON PG 27

PG 26F 61



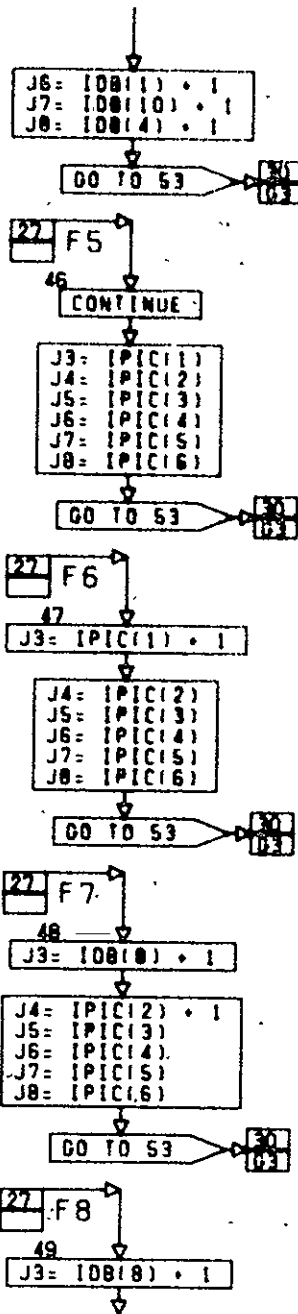
CONT. ON PG 28

PG 27 OF 61



CONT. ON PG 29

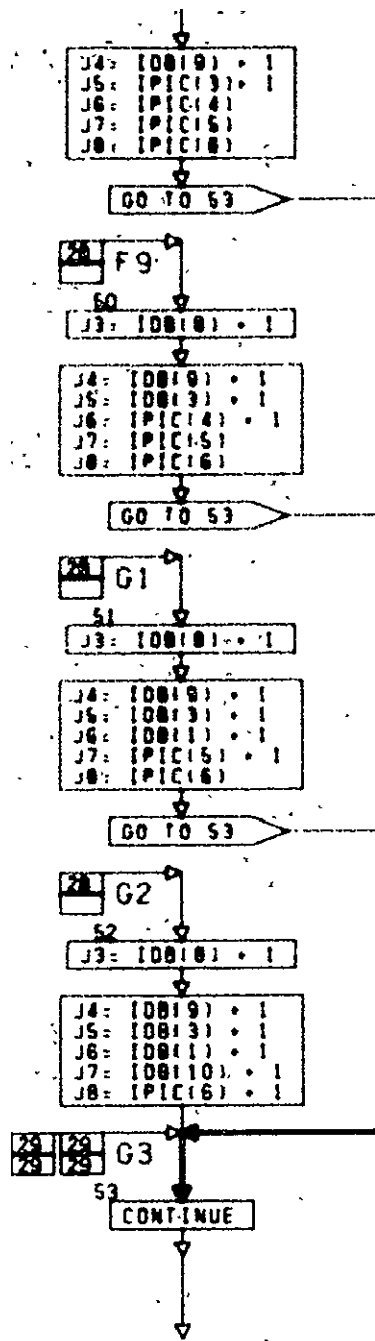
PG 28 OF 61



CONT. ON PG 30

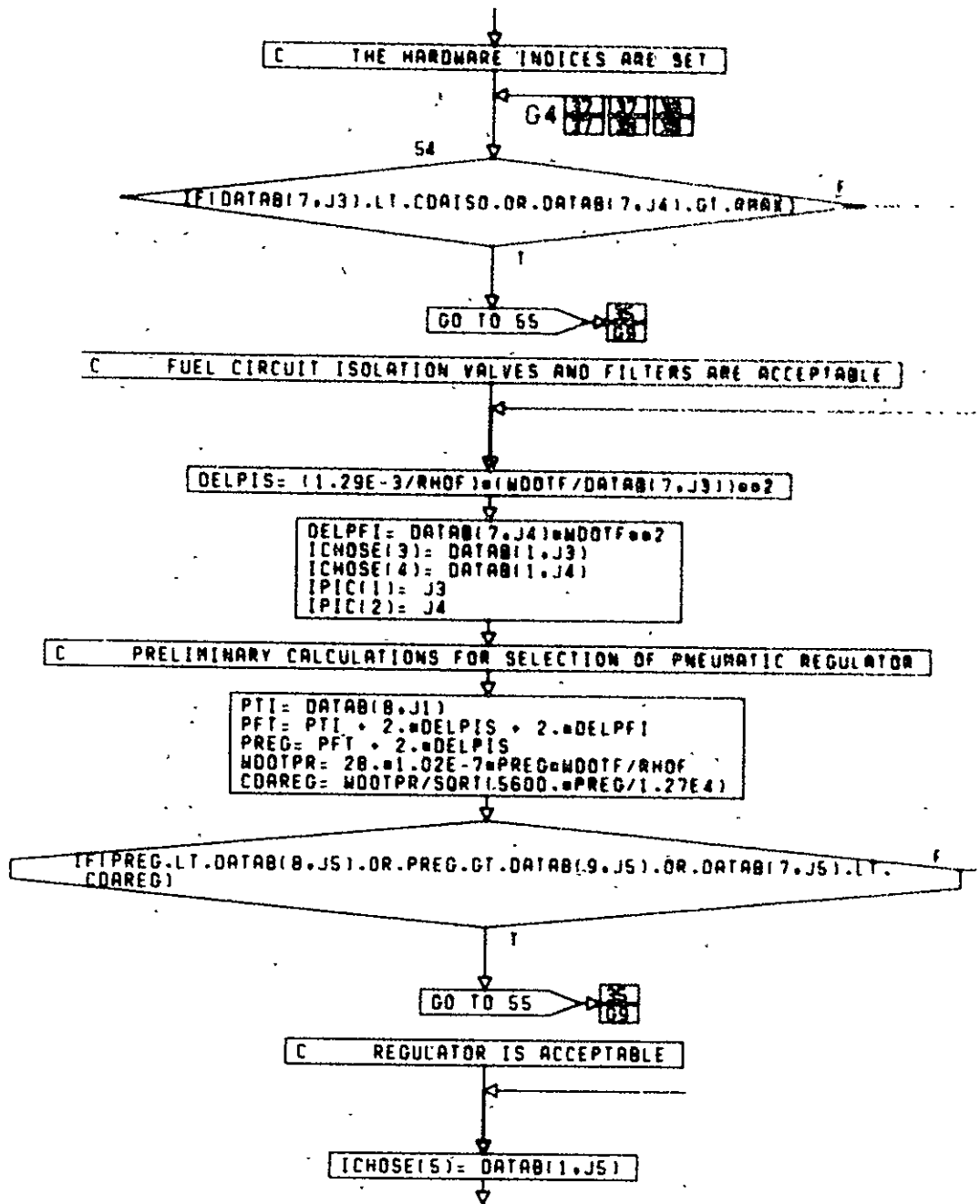
PG 29F 61





CONT. ON PG 31

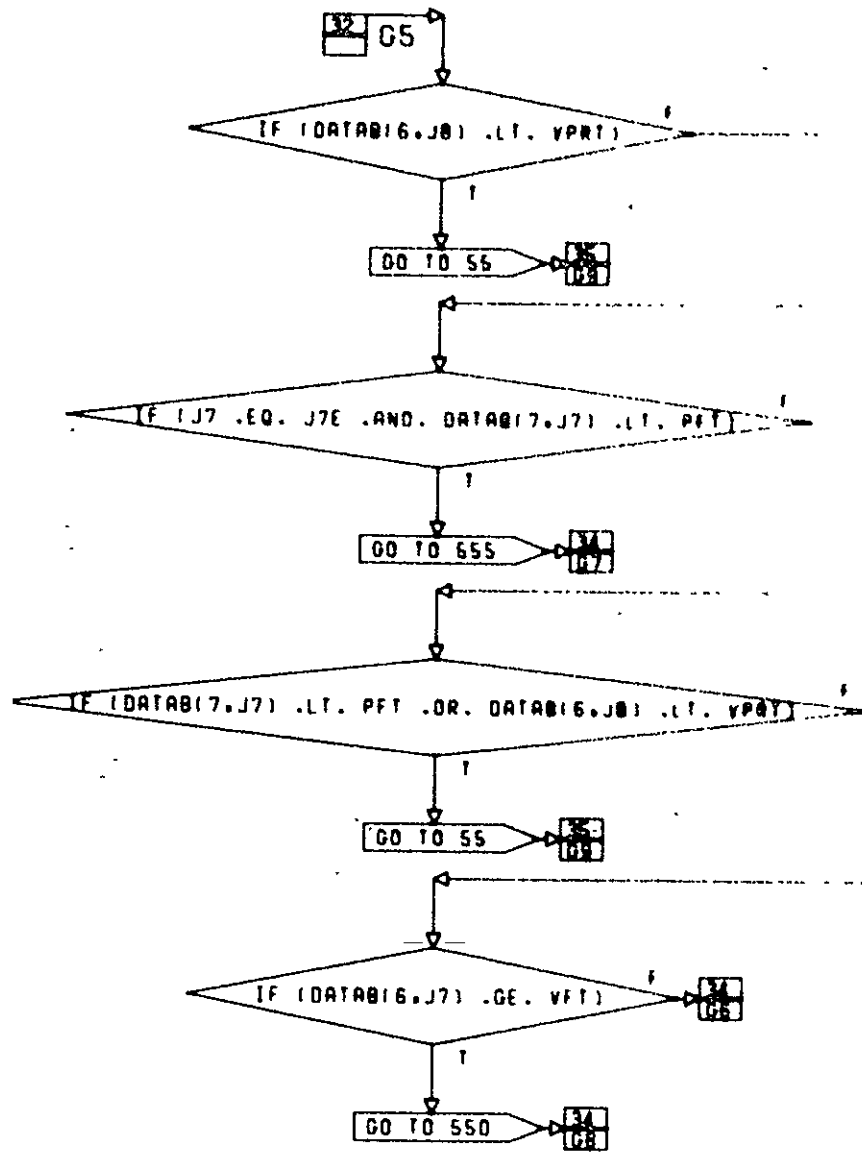
PG 30E 61



CONT..ON PG 32

PG 3 OF 61

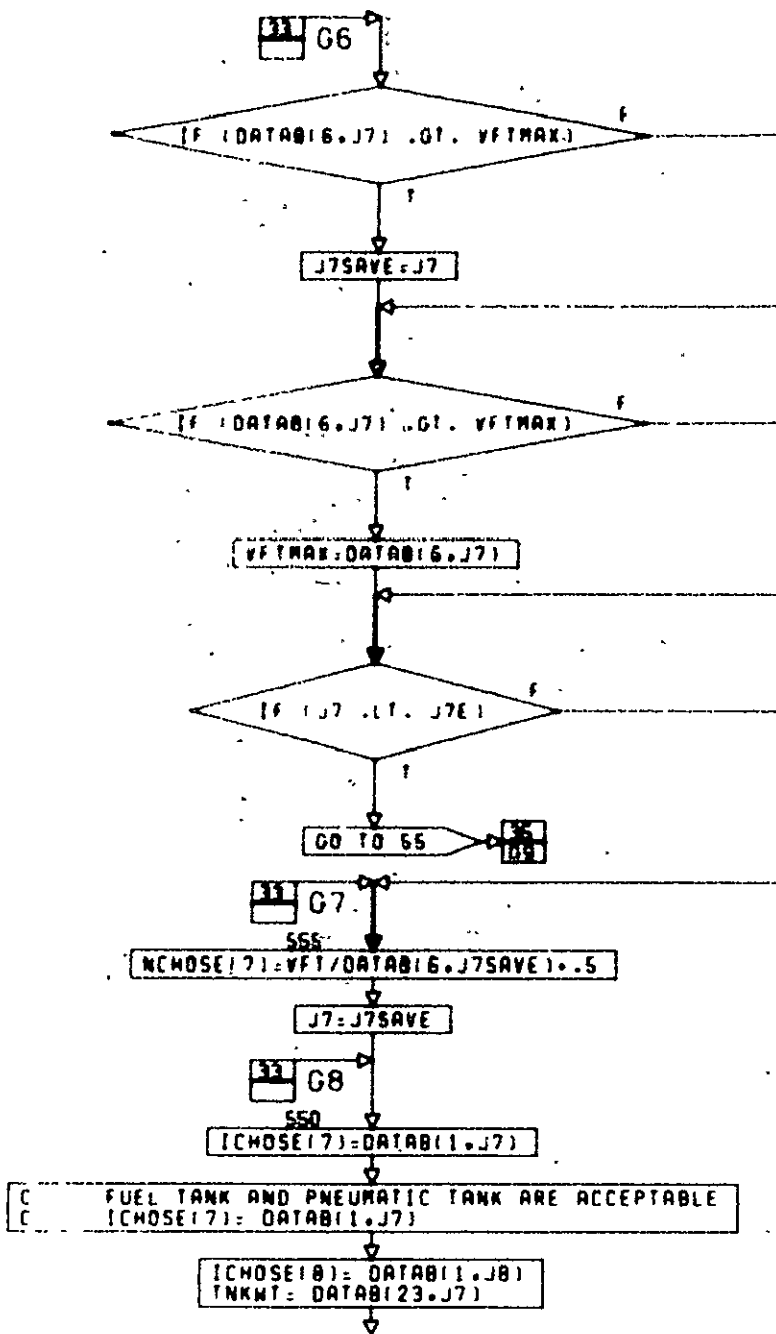




CONT. ON PG 34

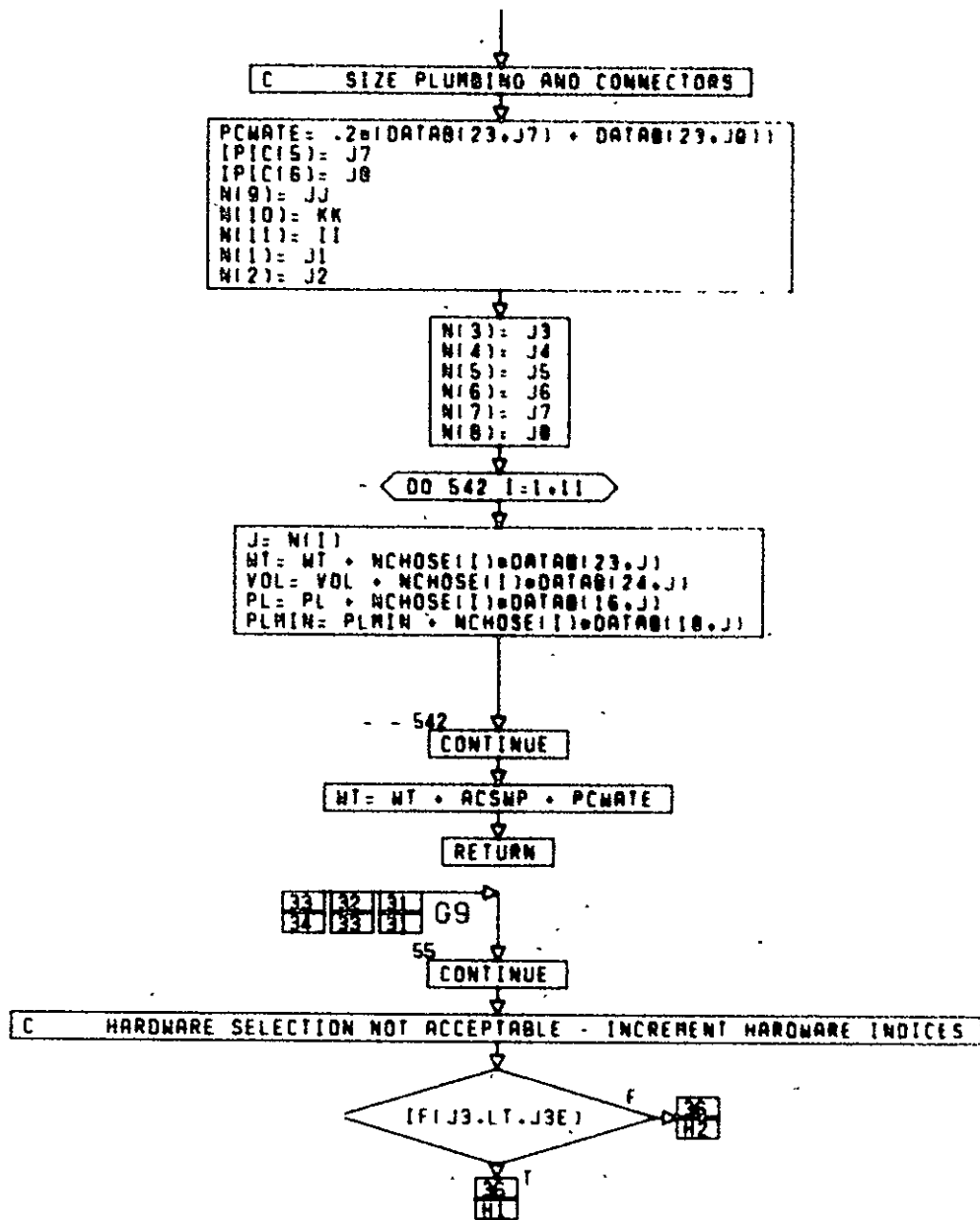
PQ 30F 61

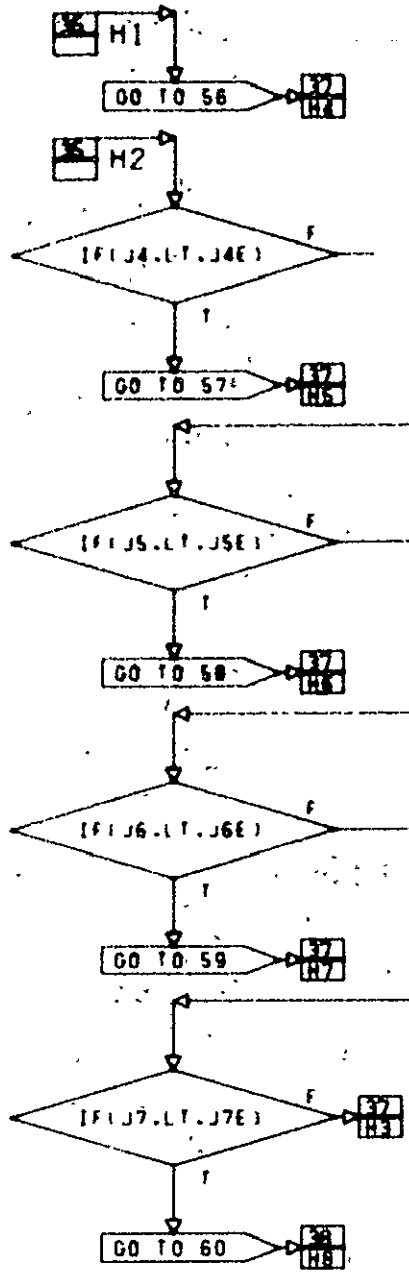
ORIGINAL PAGE IS  
OF POOR QUALITY



CONT. ON PG 35

PG 30F 61



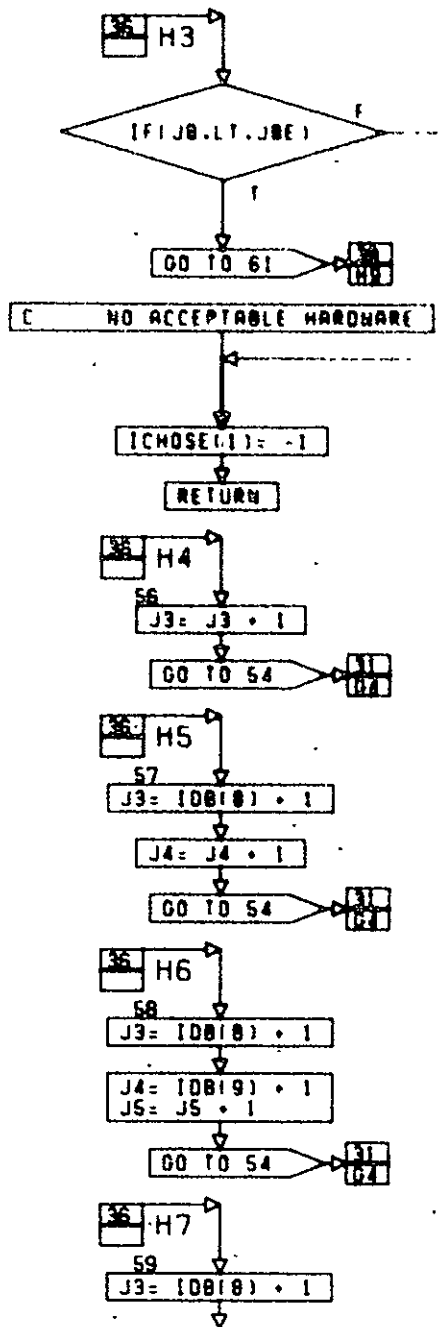


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OF POOR QUALITY

CONT. ON PG 37

PG 38 OF 61

c-7

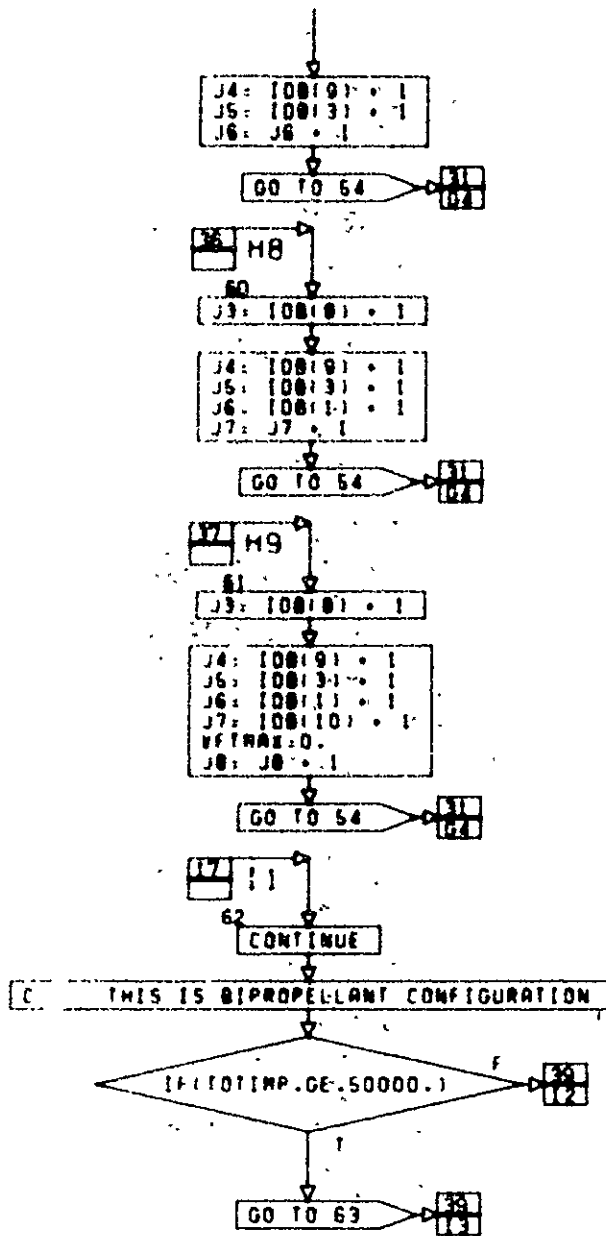


CONT. ON PG 38

PG 37 OF 61

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OF POOR QUALITY





CONT. ON PG 39

PG 38OF 61

C THIS IS NOT AN ACCEPTABLE CONFIGURATION

12

ICHOSE(I) = 1

RETURN

13

CONTINUE

IFILTER.NE.0

GO TO 65

C INITIALIZE ICHOSE, NCHOSE, IERR AND SELECT HARDWARE NOT SIZED  
C I.E., FILL AND DRAIN VALVES, FILL AND VENT VALVE AND BELIEF  
C VALVE

DO 64 I=1,14

ICHOSE(I) = 0

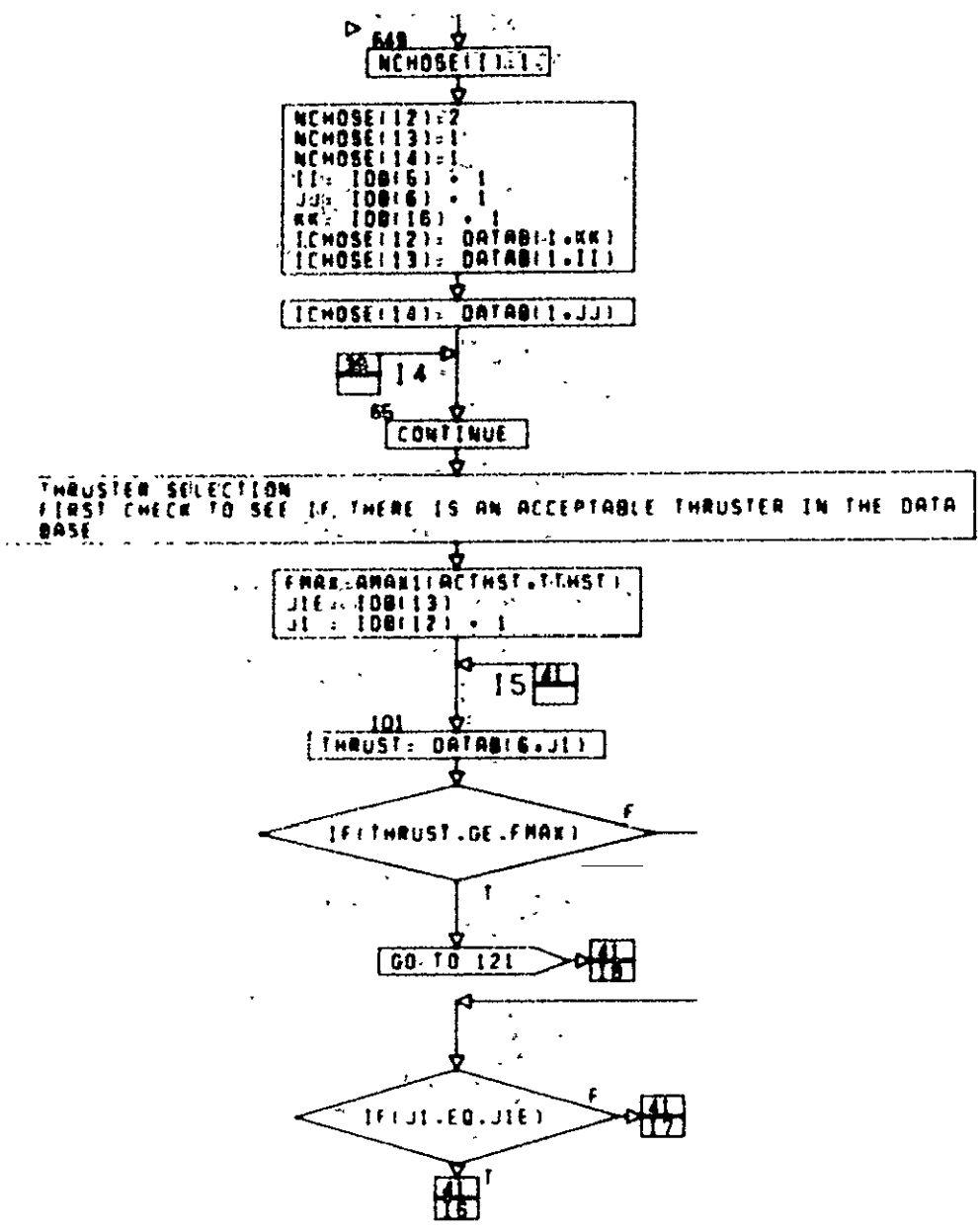
64  
NCHOSE(I) = 0

IERR = 0  
NCHOSE(1) = 6  
NCHOSE(2) = 2  
NCHOSE(3) = 3  
NCHOSE(4) = 3  
NCHOSE(5) = 4  
NCHOSE(6) = 4

DO 649 I=7,11

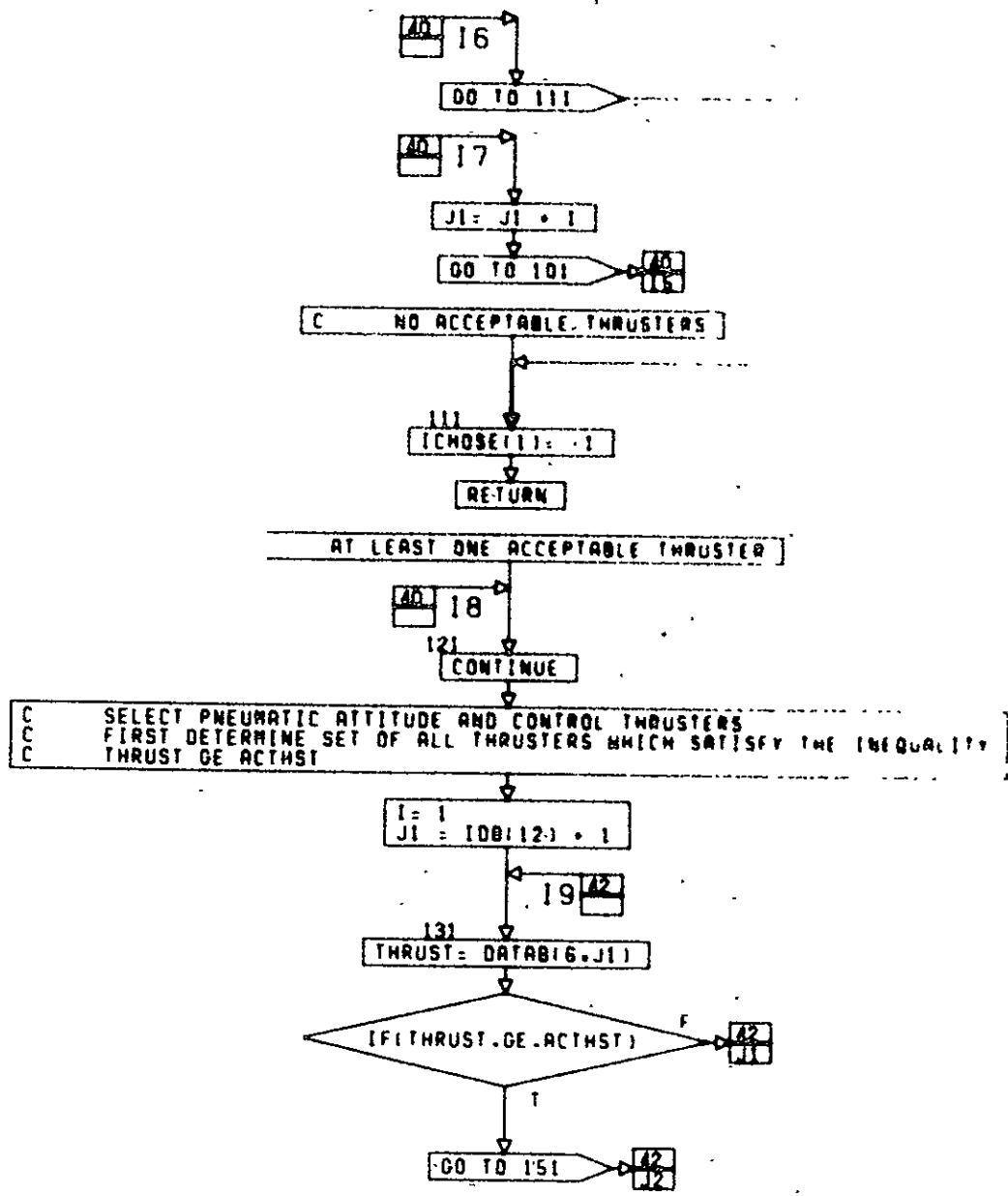
CONT. ON PG 40

PG 39F 61



CONT. ON PG 41

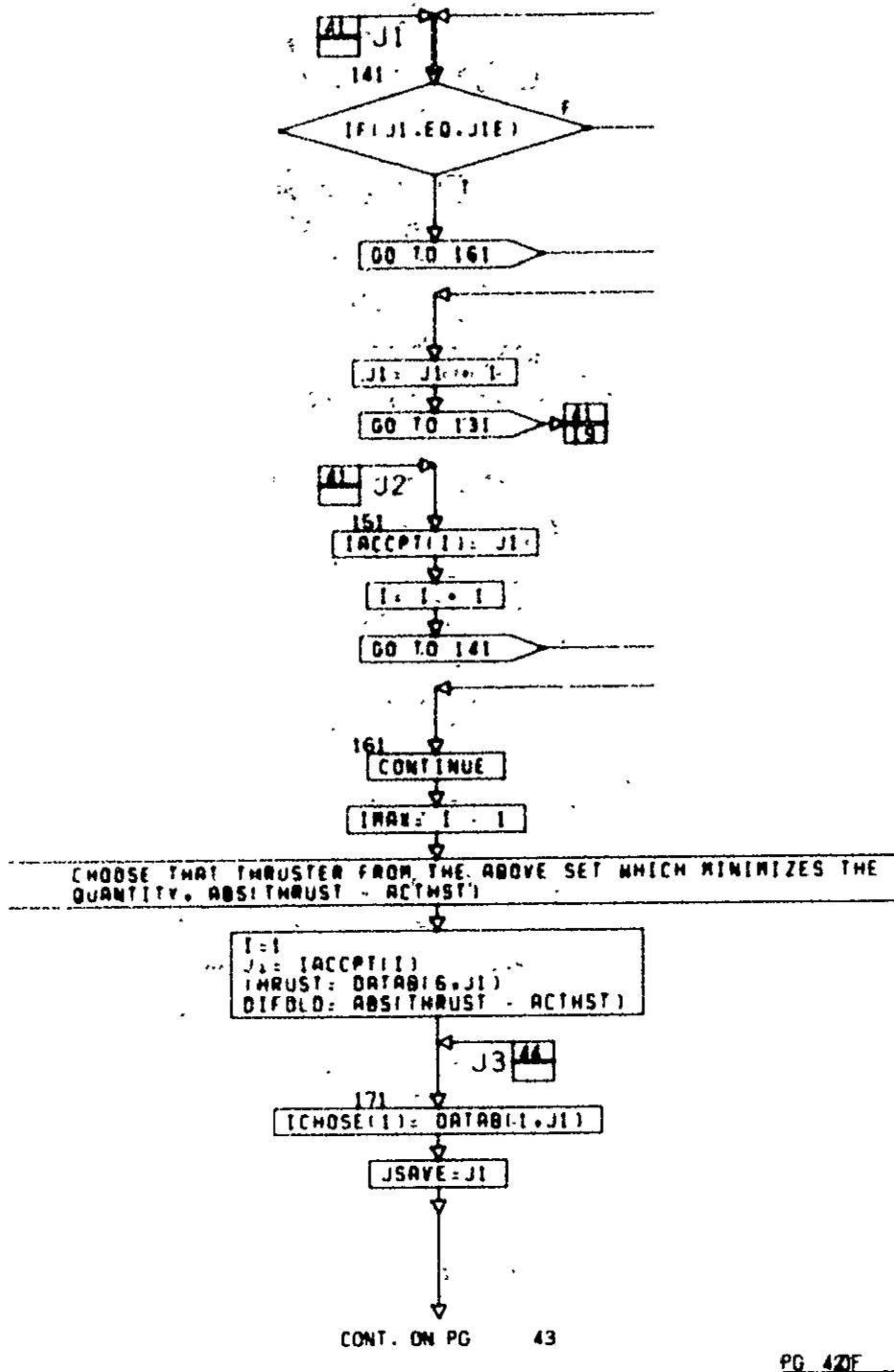
PG 40F

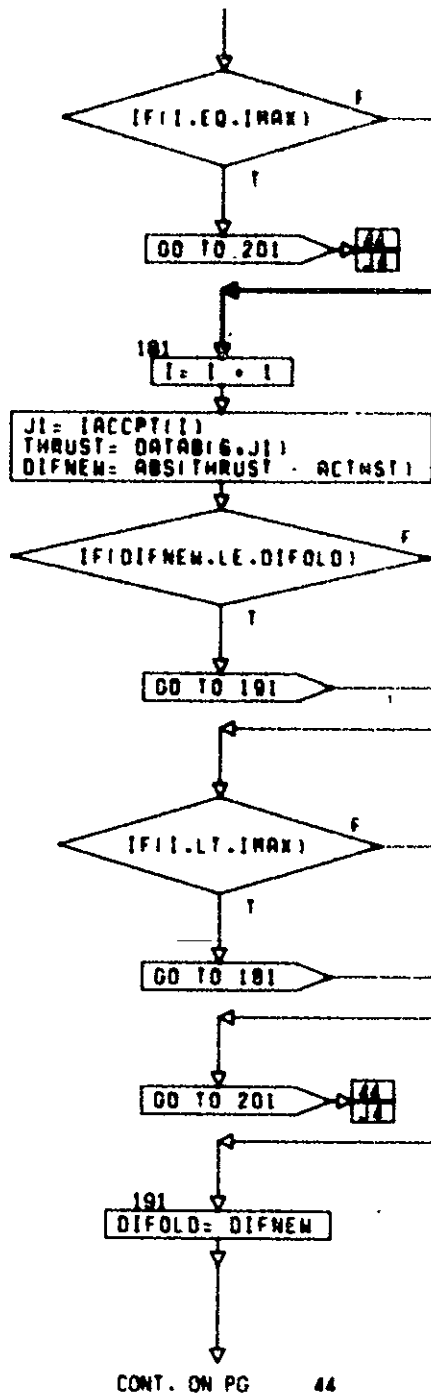


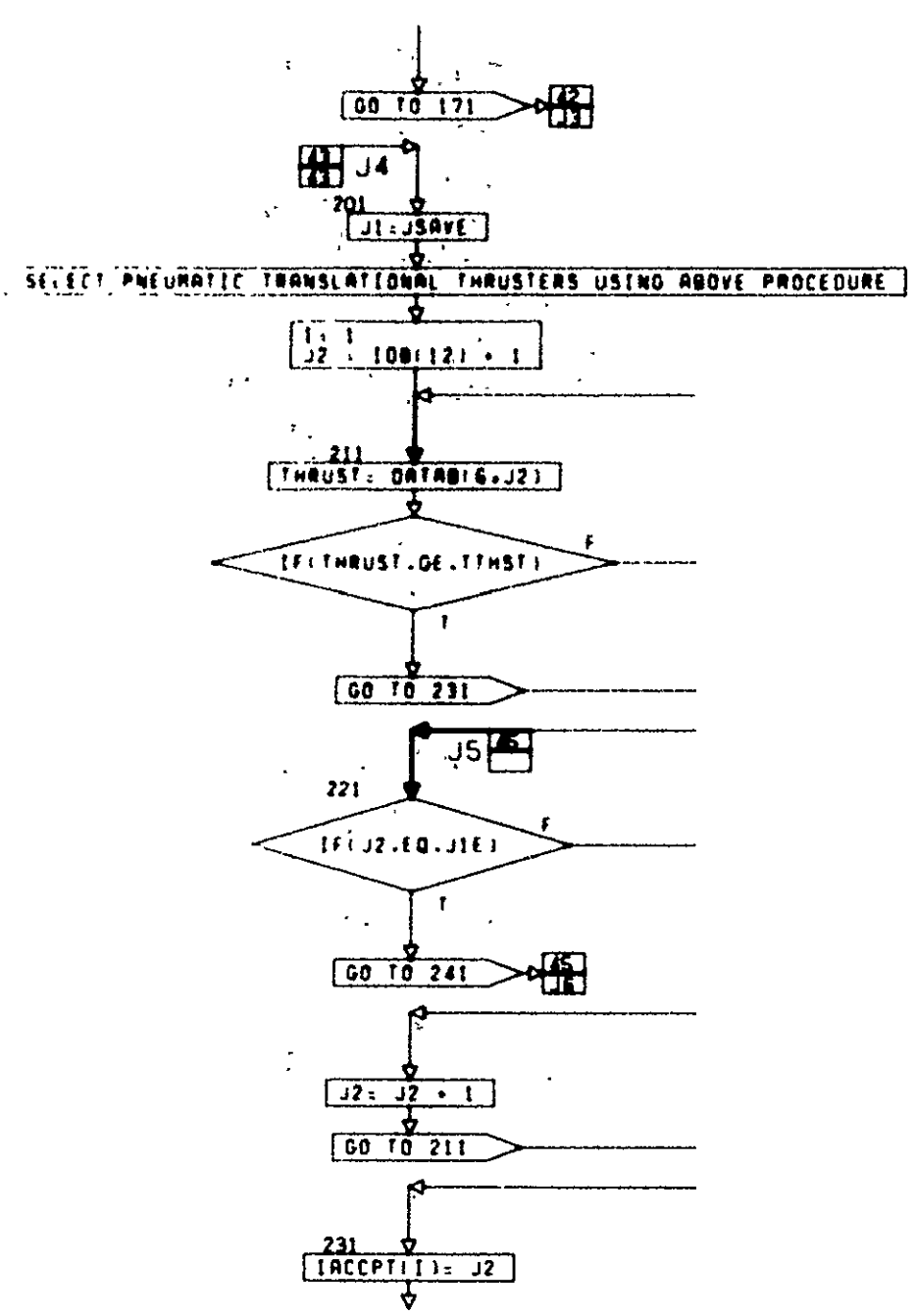
CONT. ON PG 42

PG 4 OF 61

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OF POOR QUALITY

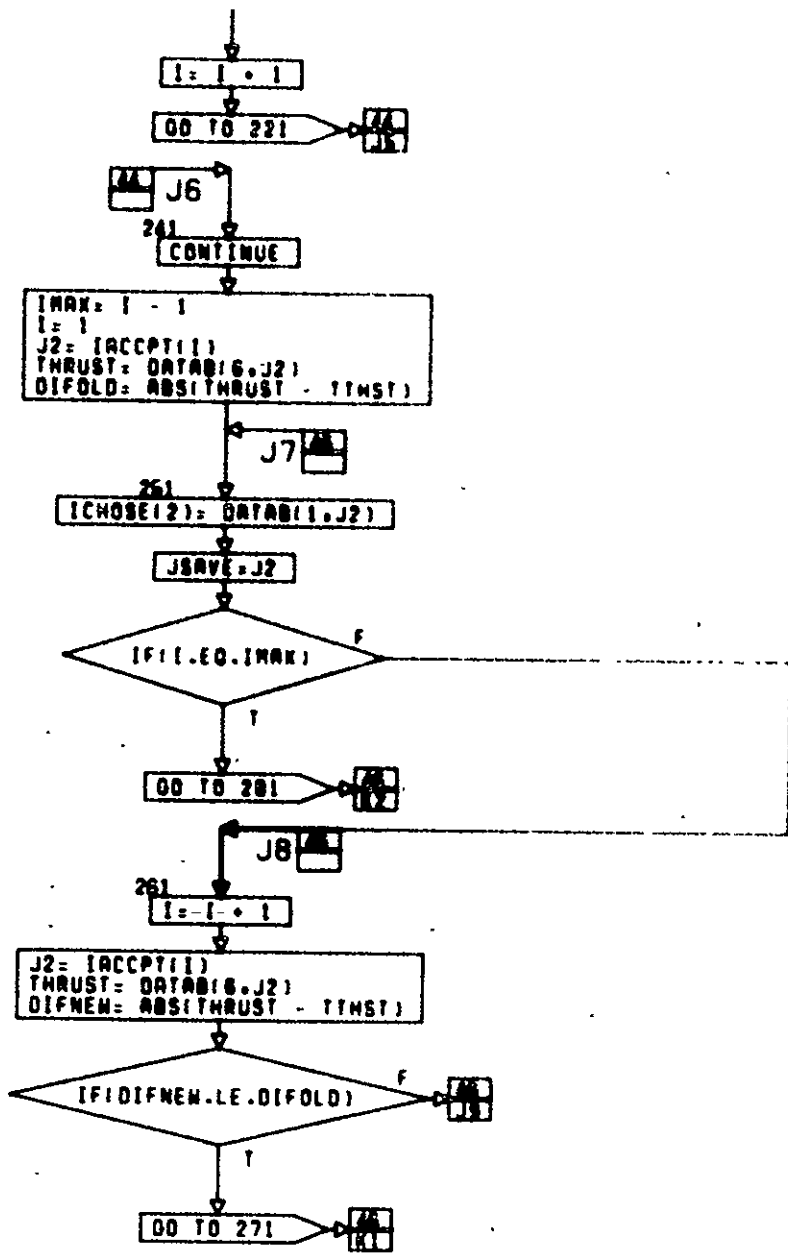






CONT. ON PG 45

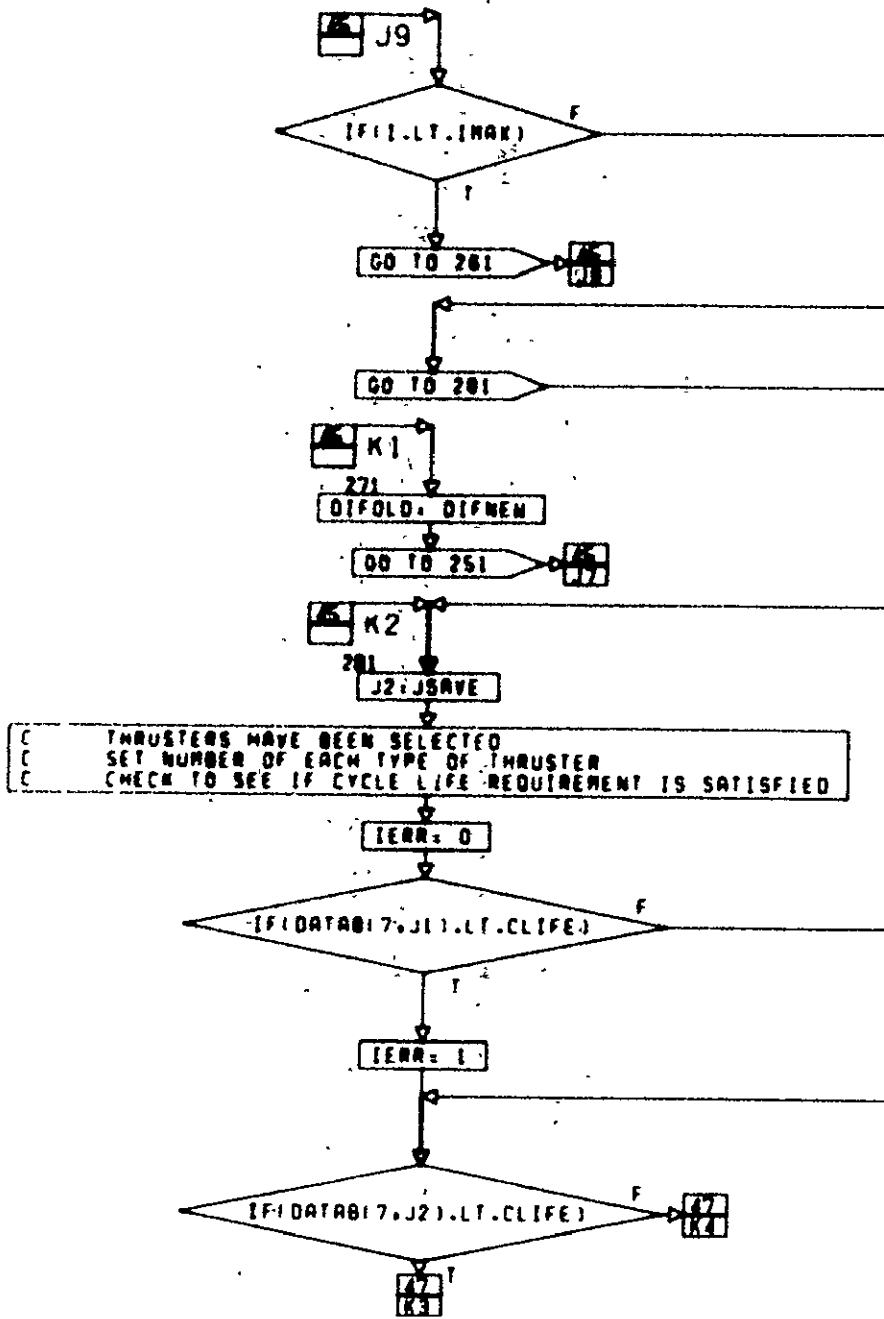
PG 40F 61



CONT. ON PG 46

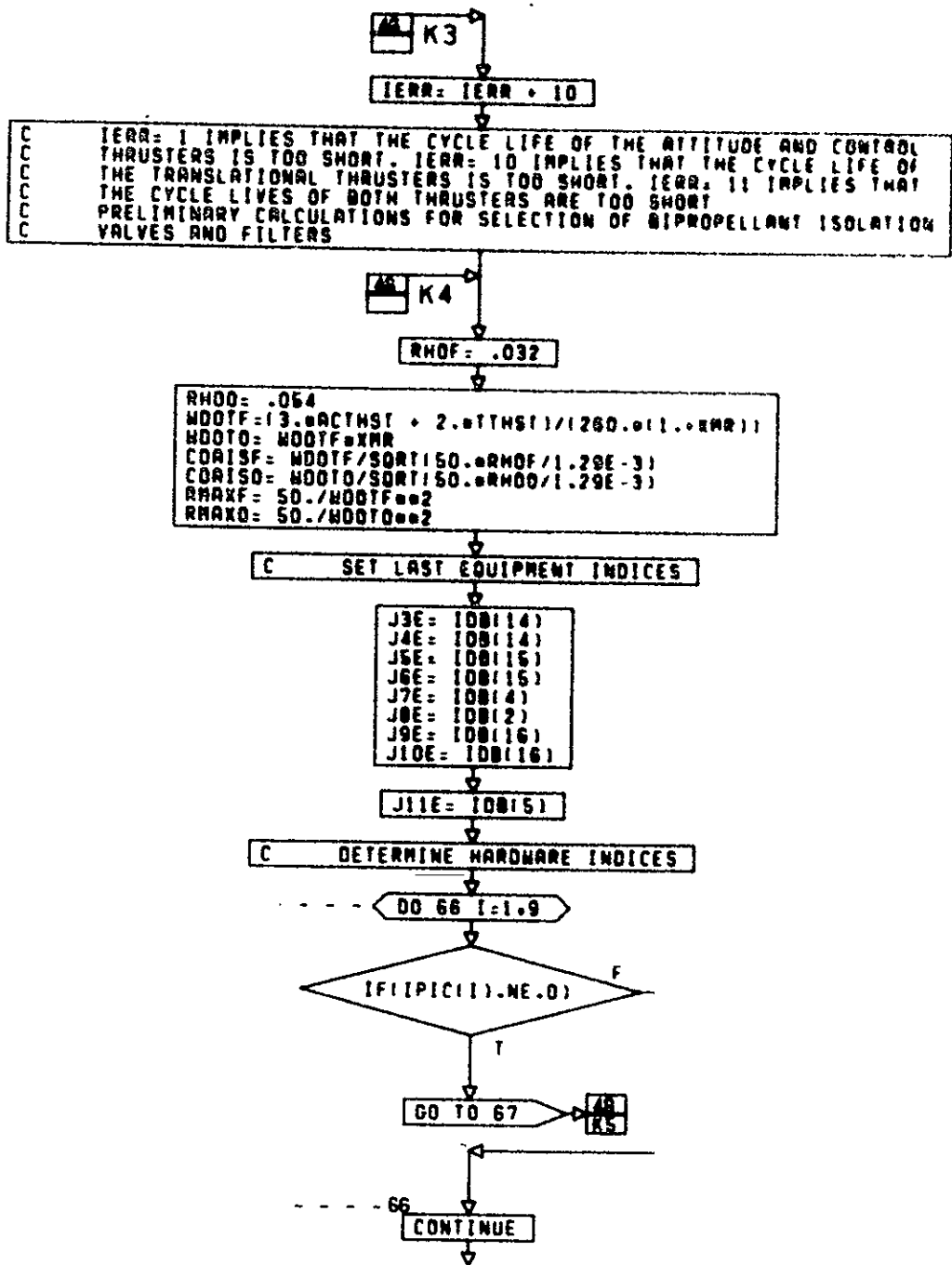
PG 45F 61





CONT. ON PG 47

PG 48F 61

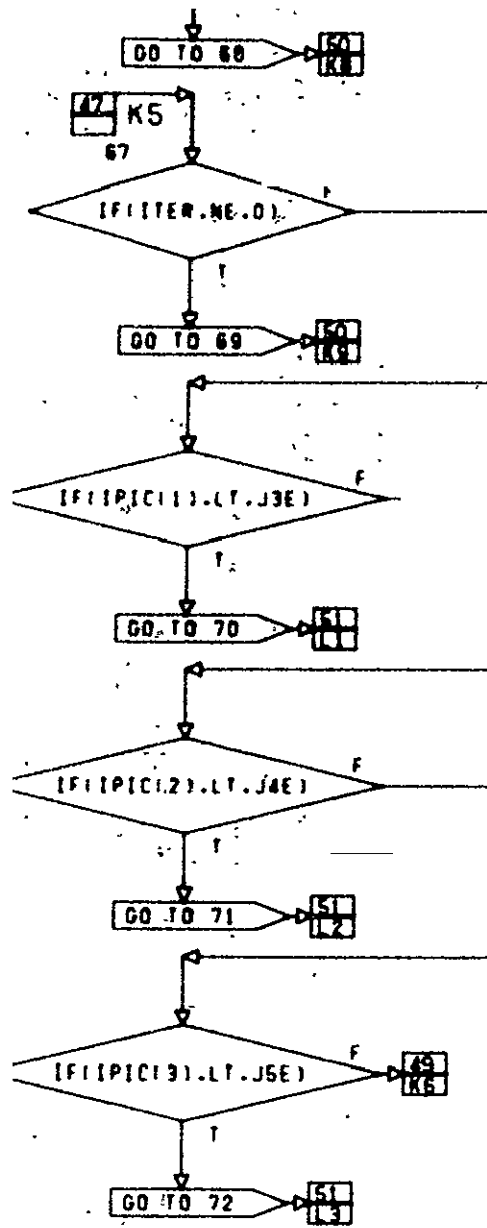


CONT. ON PG 48

PG 47E 61

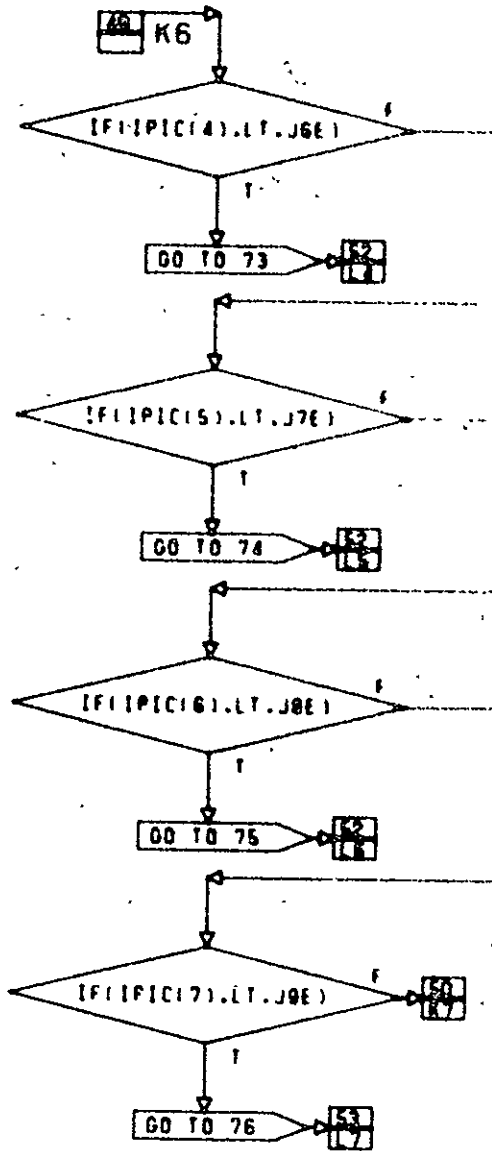
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OF POOR QUALITY

10-299



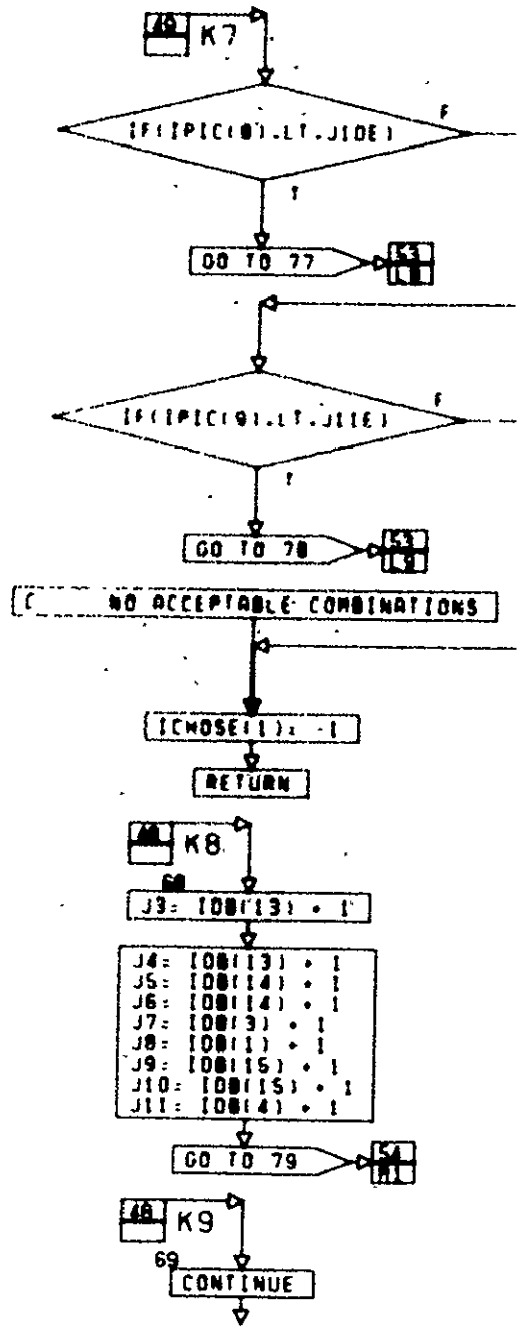
CONT. ON PG 49

PG 48F 61



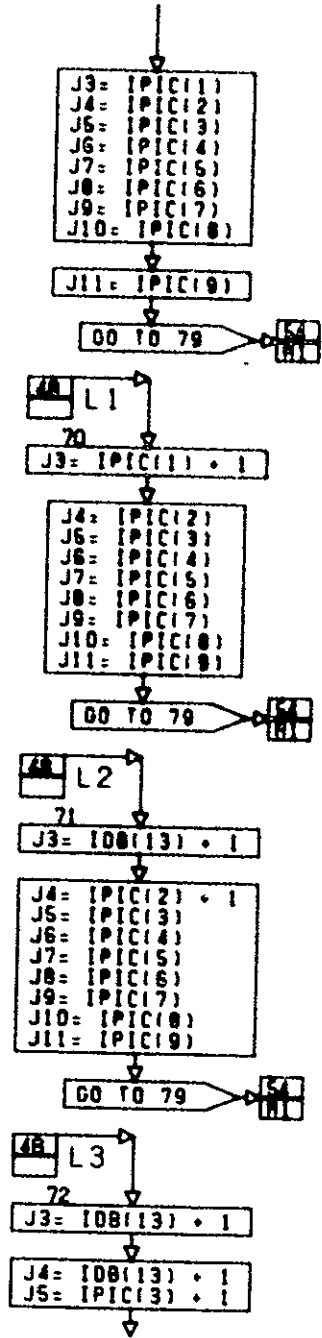
CONT. ON PG 50

PG 49E 61



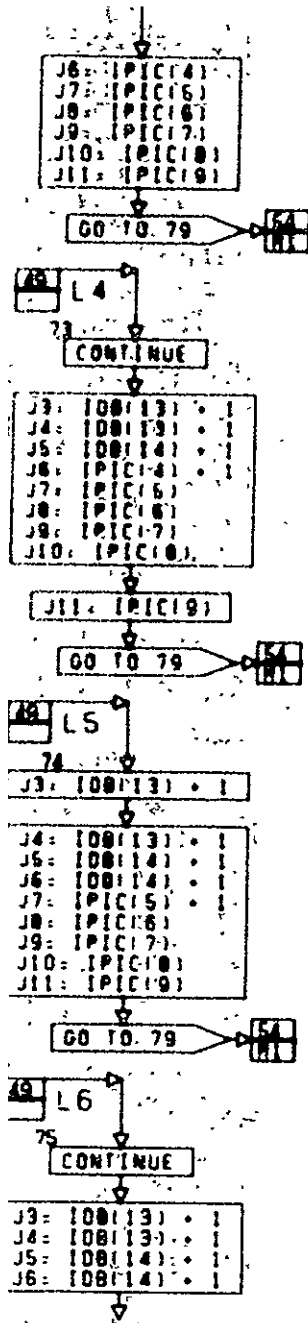
CONT. ON PG 51

PG 50F 61



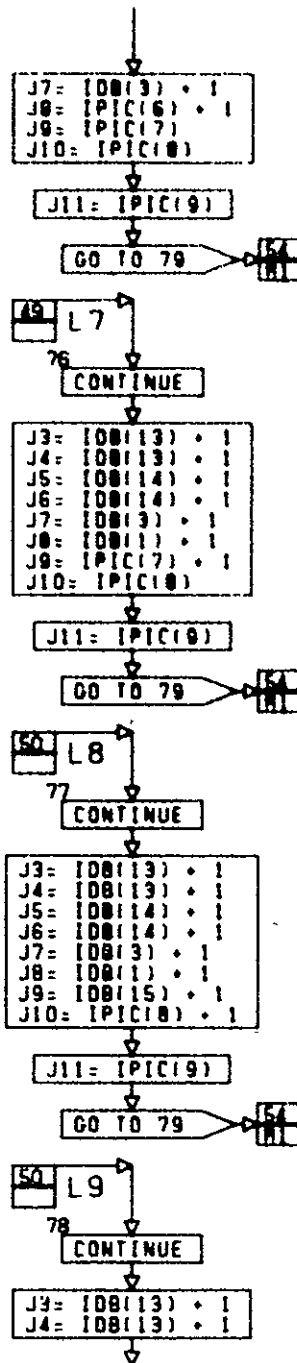
CONT. DN PG 52

PG 50F 61



CONT. DN PG 53

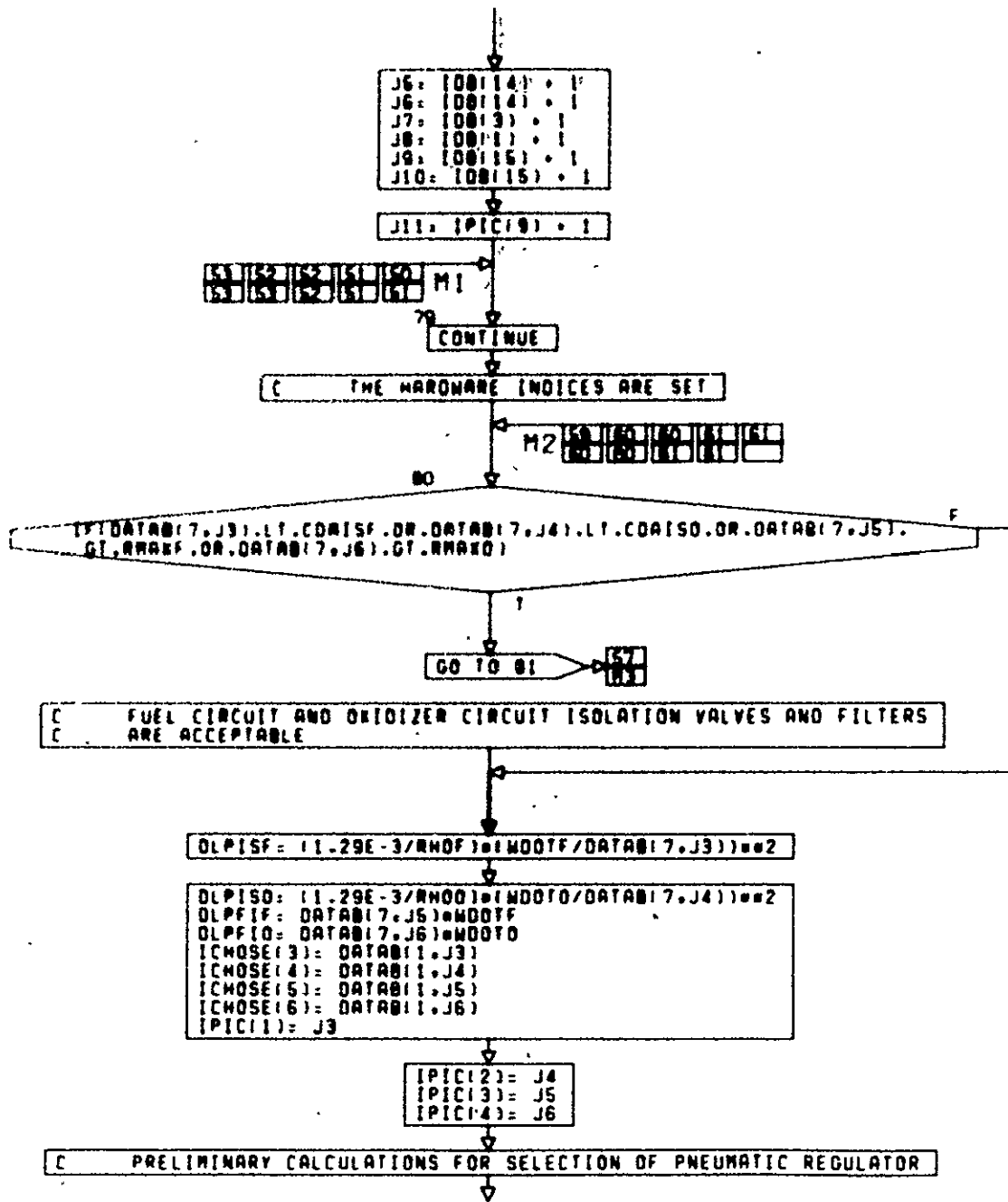
PG 52F 61



CONT. ON PG 54

PG 53F 61





CONT. ON PG 55

PG 54 OF 61

```

PTI = DATA(8,J1)
PFI = PTI * 2. * DLPISF * 2. * DLPFIF
POT = PTI * 2. * DLPISO * 2. * DLPFID.
PREQ = ARAXI(PFI,POT)
WDOTPR = 1.05 * 1.02E-7 * 28. * PREQ * (WDOTF/RHOF + WDOTD/RHOD)
CDAREQ = WDOTPR/SQRT(15600. * PREQ/1.27E4)

```

```

IF (PREQ.LT.DATA(8,J7).OR.PREQ.GT.DATA(9,J7).OR.DATA(7,J7).LT.
CDAREQ)

```

```

GO TO B1

```

```

C REGULATOR IS ACCEPTABLE

```

```

[CHOSE(7) = DATA(1,J7)]

```

```

[PI(5) = J7]

```

```

C PRELIMINARY CALCULATIONS FOR SELECTION OF PNEUMATIC ISOLATION
C VALVE

```

```

RHOPR = 1.02E-7 * 3000.
CDAI50 = WDOTPR/SQRT(200. * RHOPR/1.29E-3)

```

```

IF (DATA(7,J8).LT.CDAI50)

```

```

GO TO B1

```

```

C PNEUMATIC ISOLATION VALVE IS ACCEPTABLE

```

```

[CHOSE(8) = DATA(1,J8)]

```

```

[PI(6) = J8]

```

```

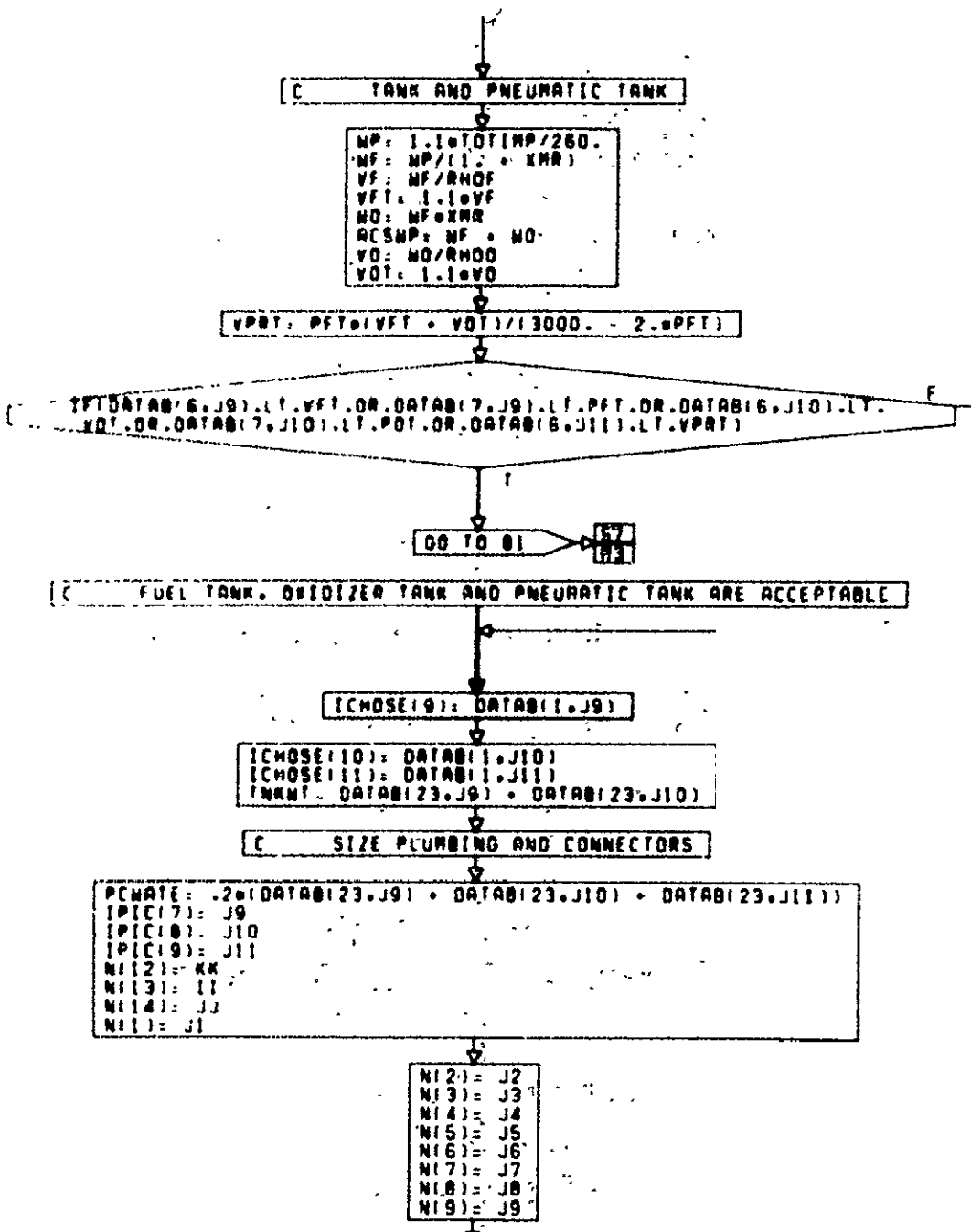
C PRELIMINARY CALCULATIONS FOR SELECTION OF FUEL TANK OXIDIZER

```

CONT. ON PG 56

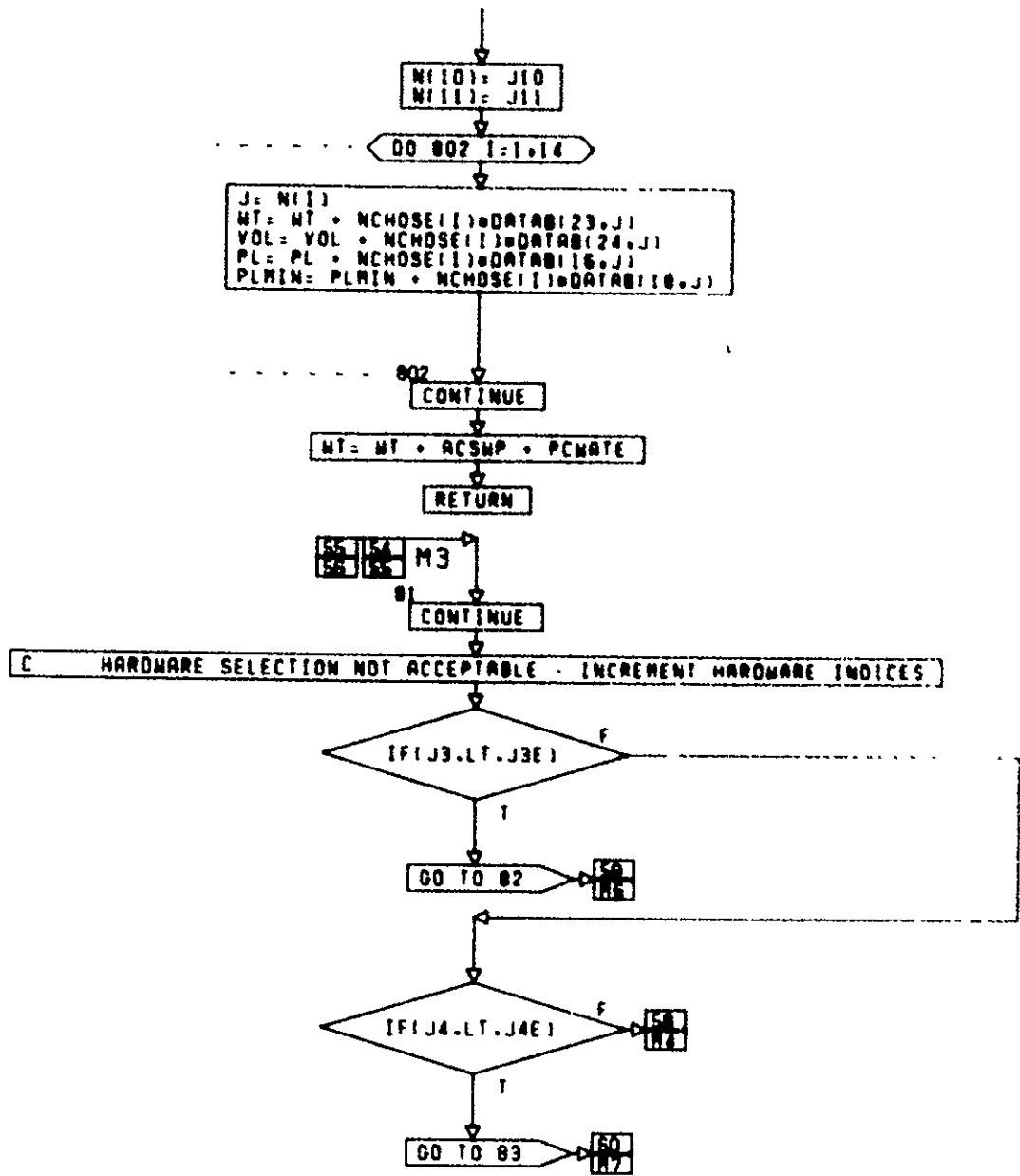
PG 55F 61

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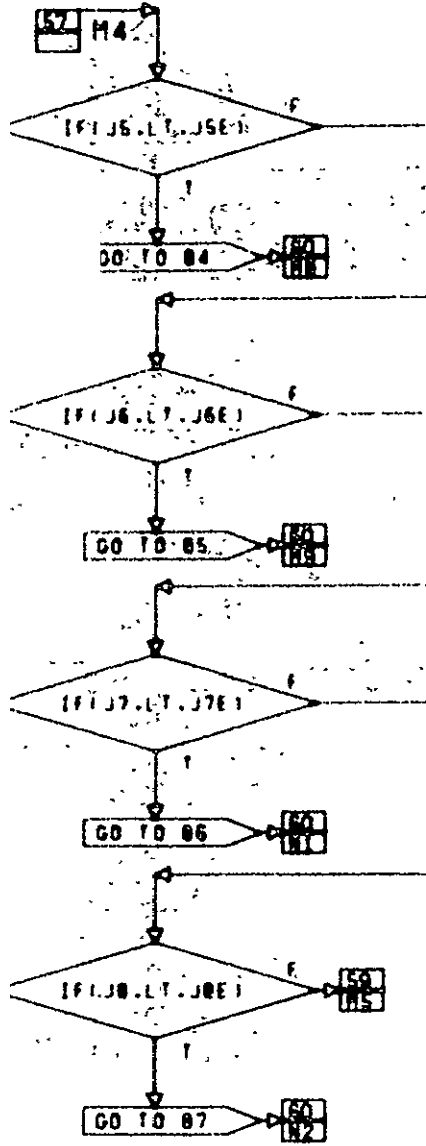
CONT. ON PG 57

PG 58 OF 61



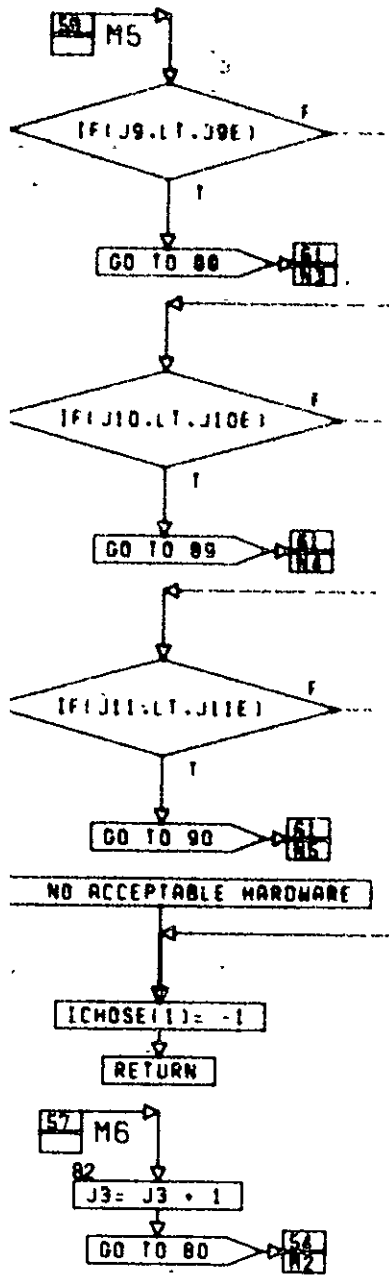
CONT. ON PG 58

PG 57F 61



CONT. ON PG 59

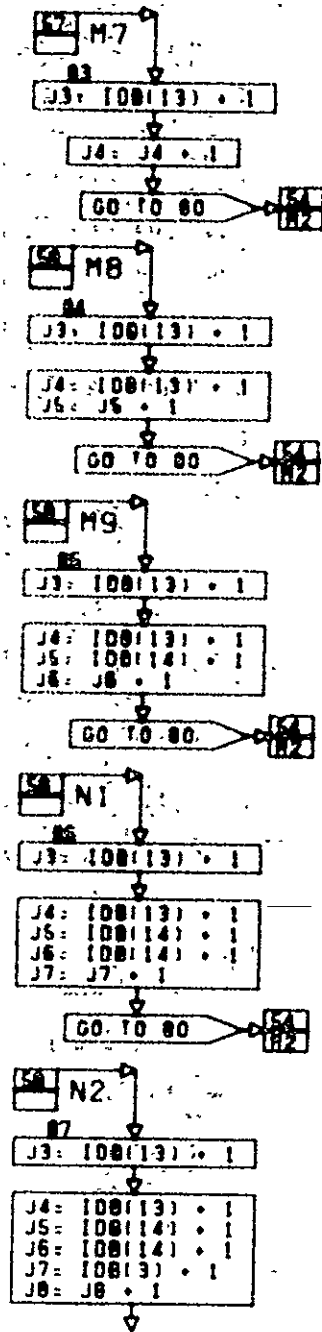
PG 50F 51



CONT. DN PG 60

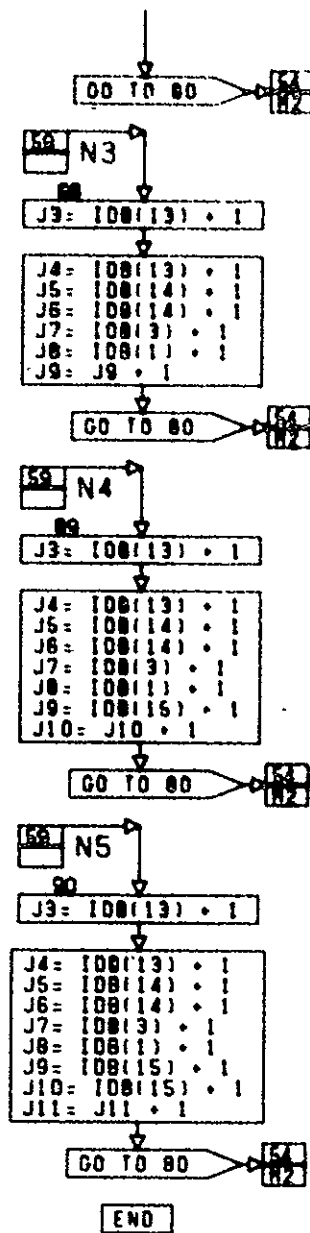
PG 59E 61

ORIGINAL PAGE IS  
OF POOR QUALITY



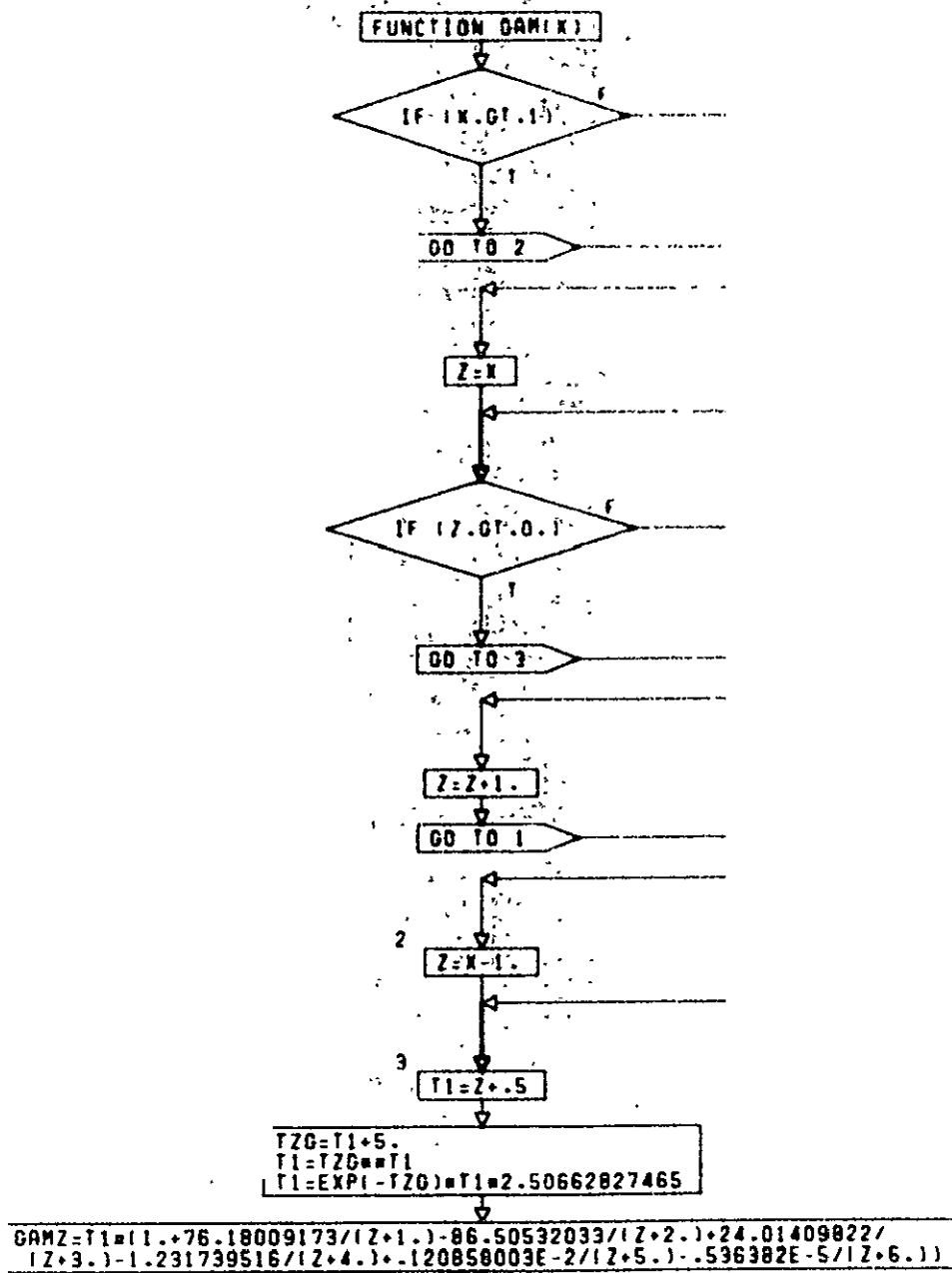
CONT. ON PG 61

PG 600F 61



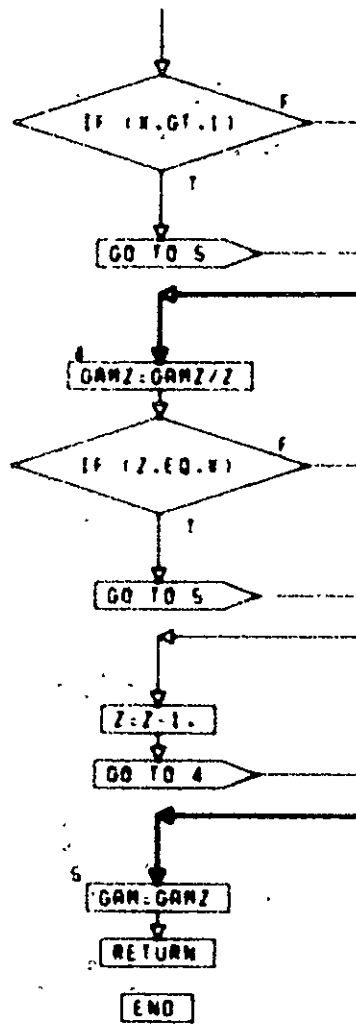
PG 61 FINCH



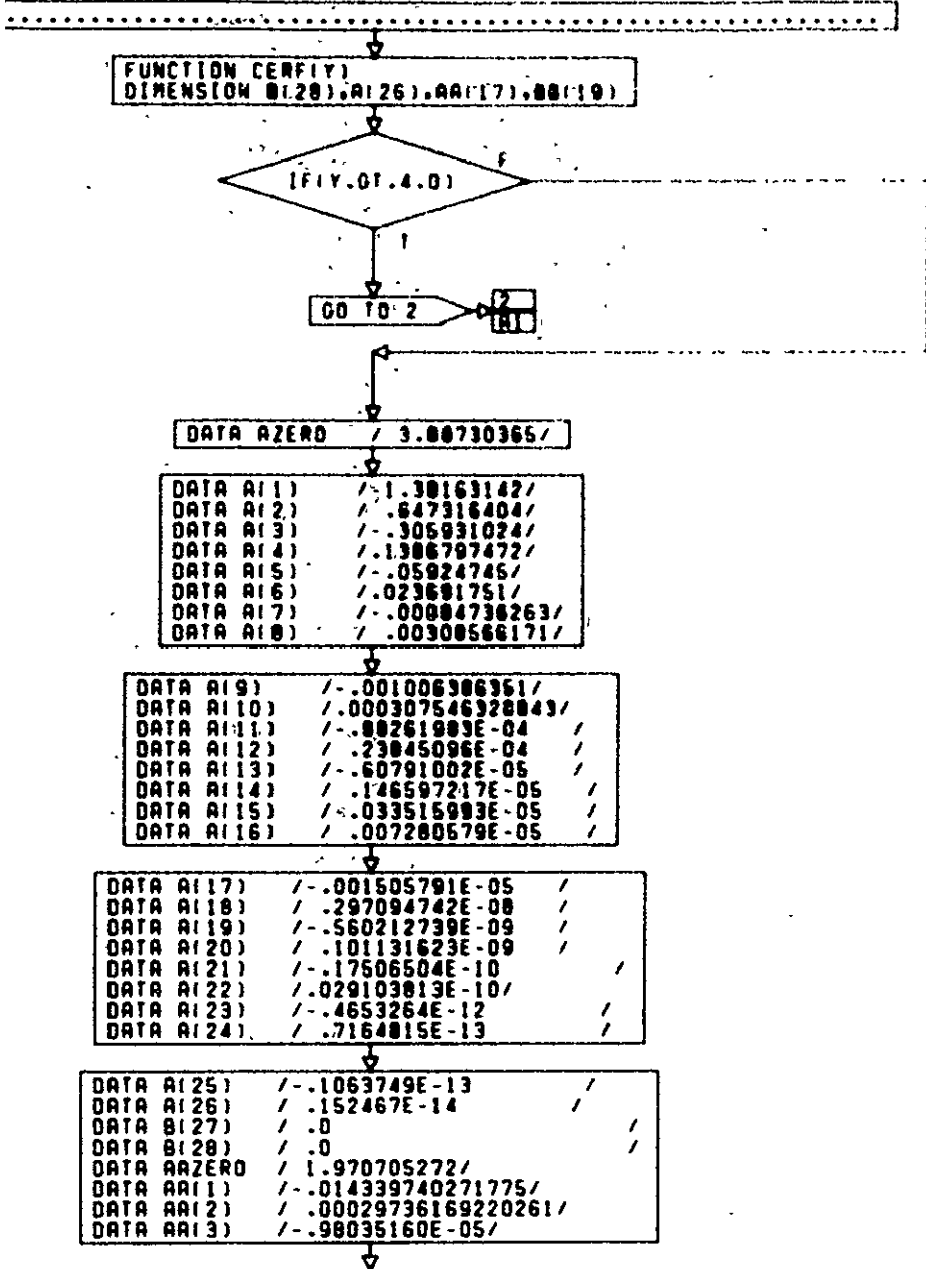


CONT. ON PG 2

PG 1 OF 2



PG 2 FINAL



CONT. ON PG 2

PG 1 OF 3

```

DATA AA(4) / .04331334E-05 /
DATA AA(5) / .2362150E-07 /
DATA AA(6) / .1516496E-08 /
DATA AA(7) / .11084939E-09 /
DATA AA(8) / .90426801E-11 /
DATA AA(9) / .80947054E-12 /
DATA AA(10) / .7853856E-13 /
DATA AA(11) / .817918E-14 /

```

```

DATA AA(12) / .90715E-15 /
DATA AA(13) / .10846E-15 /
DATA AA(14) / .01315E-15 /
DATA AA(15) / .00170E-15 /
DATA AA(16) / .00023E-15 /
DATA AA(17) / .00003E-15 /
DATA BB(8) / .0 /
DATA BB(9) / .0 /

```

```

X=V/A.
COEFF=A.0#X-2.

```

```
DO 1 I=1,26
```

```
J=27-I
```

```
BB(J)=COEFF#BB(J-1)-BB(J-2)+AA(J)
```

```

BZERO=COEFF#BB(1)-BB(2)+AZERO
CEFF=X/2.#BZERO-BB(2)

```

```
RETURN
```

```

1
A1
2

```

```
X=A./V
```

```
COEFF=A.0#X-2.
```

```
DO 3 I=1,17
```

```
J=18-I
```

```
BB(J)=COEFF#BB(J-1)-BB(J-2)+AA(J)
```

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OF POOR QUALITY

BBZERO=COEFF\*BB(1)-BB(2)\*AAZERO  
CERF=(BBZERO-BB(2))/12.\*Y\*(EXP(Y)-1)\*.564109503547756

RETURN

END

PG 3 FINAL

C .....

SUBROUTINE RELY (IRTN,IDS,NEQUIP)

COMMON /BTM/WT,VOL,DT,P,DK,DY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLIN,  
D,AREA,SATLO,WATE,NC,ACSWP,HARMNT,INCMNT,CONVNT,INXMT,PASSTR,  
SATNT,TPRM,IBTLOC,RADA,RADAB,RAI,HTAPWA,HTAPAB,  
HPT,HTPIPE,VCHP,HTPT,FC,NZERO,CONRT,ACSSN,BITRAT(2),  
EQBLG,SABOLG,SATNT

COMMON /USER/KEOPT,SYSLB,RFIXED,SLBAX,ISPT,SPEC(6),CONS,ISUB  
COMMON /USER1/EQ1WT,EQ2WT,DIAMAX,ALT

COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COSTM(5,60),DATA(6,60),  
TMA(4,60),DPIA(11,60),SKD(7,60)

COMMON /PATCOM/ACCRCY,CISTAR,IREL,MMOOLD,TRUNC,ITRUNC,DE,TE,  
TOOLA,QCR,SEIR,PAR,PE,PU,TOOLU,QCP,SEIP,PRP,SATA,SATINV,NER,  
MEINV,PAYR,PAUINV,PAYOUL,GSE,XLTOT,CTOT,FEER,FEETNV,DDTE,NVEST,  
OPS,SKTAU(6),ROLD(60),TSATT,AN,TS,DS,AM,TF,BF,TC,TA,TB,TOTOPS

COMMON /USER5/IVOLT,TDI  
DIMENSION N(5),NEQUIP(5)

COMMON /DBCOM/R(31),NR(60),R(131,60),Z(31),RO(31),ROUM(31),SAVR(31),  
SAVRN(31),RNEW(31),MAX(60),SAVMX(60),COST(60),DUM(2563)

REAL MMOOLD,MMONEN,LANS,NZERO  
INTEGER SAVMX,SAVNSR

VARIABLES	SIZE	INITIAL ORIGIN-CHANGE	DEFN
NSMX	1	EXT-NC	MAX NUM SYSTEM REDUNDANCIES
NSR	1	EXT-C	CURRENT NUM OF SYSTEM REDUNDANCIES
IRTN	1	EXT-NC	RETURN INDICATOR

JMIN	1	EXT-NC	LOWER LIMIT ON MODULE NUM
JMAX	1	EXT-NC	UPPER LIMIT ON MODULE NUM
NR	N(NSS)	EXT-C	CURRENT NUM OF REDUNDANCIES IN MODULE J
MAX	N(NSS)	EXT-NC	MAX NUM REDUNDANCIES IN MODULE J
NT	1	EXT-NC	=1 RITRUNC) MODE LOOP AND OPTION PARAMETER

DELH	1	EXT-NC	TIME INCREMENT
ITRUNC	1	EXT-NC	NUM OF TIME POINTS
R	ITRUNC	INT	RELIABILITY FNC FOR MODULE J =ITRUNC AND MODE

CONT. ON PG 2

PG 1 OF 24

```

C      ROLD      ITRUNC  EXT-C  PREVIOUS VALUE OF SYSTEM
C      RNEW      ITRUNC  INT    RELIABILITY
C                                     SYSTEM RELIABILITY WITH WITH A
C                                     REDUNDANCY ADDED

```

```

C      RI        ITRUNC  EXT-C  SYSTEM RELIABILITY MATRIX
C      COST      *NINSS) EXT-NC  VALUE OF EXPENSE OPTION FOR
C      RMO        I      INT    MODULE J
C      RMO*H     I      EXT-NC  DECISION PARAMETER
C      OLDAMO    I      INT    ABSI=NEW - *OLD)/EXPENSE
C                                     LOWER BOUND FOR RMO
C                                     PREVIOUS VALUE OF RMO

```

```

C      RMOOLD   I      INT    PREVIOUS RMO VALUE
C      RMONEW   I      INT    RMO VALUE WITH A REDUNDANCY
C      JSAVE     I      INT    ADDED
C      SAVRNM   ITRUNC  INT    MODULE WITH LARGEST VALUE OF
C      SAVR     ITRUNC  INT    RMO
C                                     SYSTEM RELIABILITY FNC WITH A
C                                     REDUNDANCY IN MODULE JSAVE
C                                     RELIABILITY FNC FOR MODULE

```

```

C      SAVRMO   I      INT    JSAVE WITH A REDUNDANCY ADDED
C      SYSLB    I      EXT-C  RMO WITH A REDUNDANCY ADDED IN
C      SLBMX    I      EXT-NC  MODULE JSAVE
C      DATA(I,J) NINSS) EXT-NC  SYSTEM WEIGHT
C      IND      I      INT    MAX SYSTEM WEIGHT
C      I        I      INT    REDUNDANCY WEIGHT FOR MODULE J
C                                     LOOP INDEX
C                                     INDEX

```

```

C      RFIXED   I      EXT-NC  INITIAL RELIABILITY
C      SUBROUTINES CALLED
C      OSF - INTEGRATION BY SIMPSON'S RULE (SSP)
C      RIMOD- RELIABILITY MODELS CALCULATION
C      .....
C      *** PROGRAM INITIALIZATIONS ***
C      .....

```

DO 110 I=1,60

110 NR(I)=0

```

C      *** USER INPUTS ***
C      KEOPT     EXPENSE OPTION INDICATOR
C      I         WEIGHT
C      OTHERWISE COST
C      RFIXED    INITIAL SYS RELIABILITY
C      SYSLB     INITIAL WEIGHT (POUNDS)
C      SLBMX     MAX SYS WEIGHT
C      TRUNC     MISSION LENGTH (HRS)

```

CONT. ON PG 3

PG 2 OF 24

```

C      ITRUNC      NUM OF TIME POINTS
C      ISUB       REQUIREMENTS OPTION
C              1 AT LEAST ONE SUB SYS SPEC
C              0 OTHERWISE NO SUB-SYS SPEC
C      ISPT       SINGLE POINT FAILURE REQUIREMENTS OPTION
C              0 REQ NOT IN EFFECT
C              1 OTHERWISE REQ IN EFFECT
C      SPECI      AND SYS REQUIREMENT (MRS)

```

```

C      SPEC(K)    R(ITRUNC) SUB-SYS REQ: R=1..NSS
C              DEFAULT VALUE IS 0.0
C      SPEC(NSS+1) R(ITRUNC) SYS REQ  DEFAULT VALUE IS 0.0
C      NIK)       CUMULATIVE NUM OF MODULES THRU SUB-SYS R

```

```

RFAL=0.7
TRUNC=TPRIM*730.
ALPHA=TRUNC/(1+ALOG(RFAL/100.625))
SPECI=CONSN*730.
ITRUNC=31
SYSLO=SATWT

```

```

C      SET NUM OF SUB SYS

```

NSS=6

```

C      ACCUMULATE N

```

N(I)=NEQUIP(I)

DO 100 I=2,NSS

N(I)=NEQUIP(I)+N(I-1)

```

C      *** SIS INPUTS ***
C      ACSHP      INITIAL EXPENDABLES WEIGHT (POUNDS)          AP
C      EMU        EXPENDABLES INITIAL MEAN LIFETIME (MRS)      AP
C      ESIG       EXPENDABLES INITIAL STD. DEV. (MRS)         AP
C      MAXEXP     MAX NUM OF EXPENDABLE INCREMENTS            AP
C      NZERO      ORBITAL MEAN MOTION (RAD/MRS)                AP
C      DC         DUTY CYCLE                                  OTHER
C      TB         BATTERY TEMP (DEGREES KELVIN)                OTHER

```

```

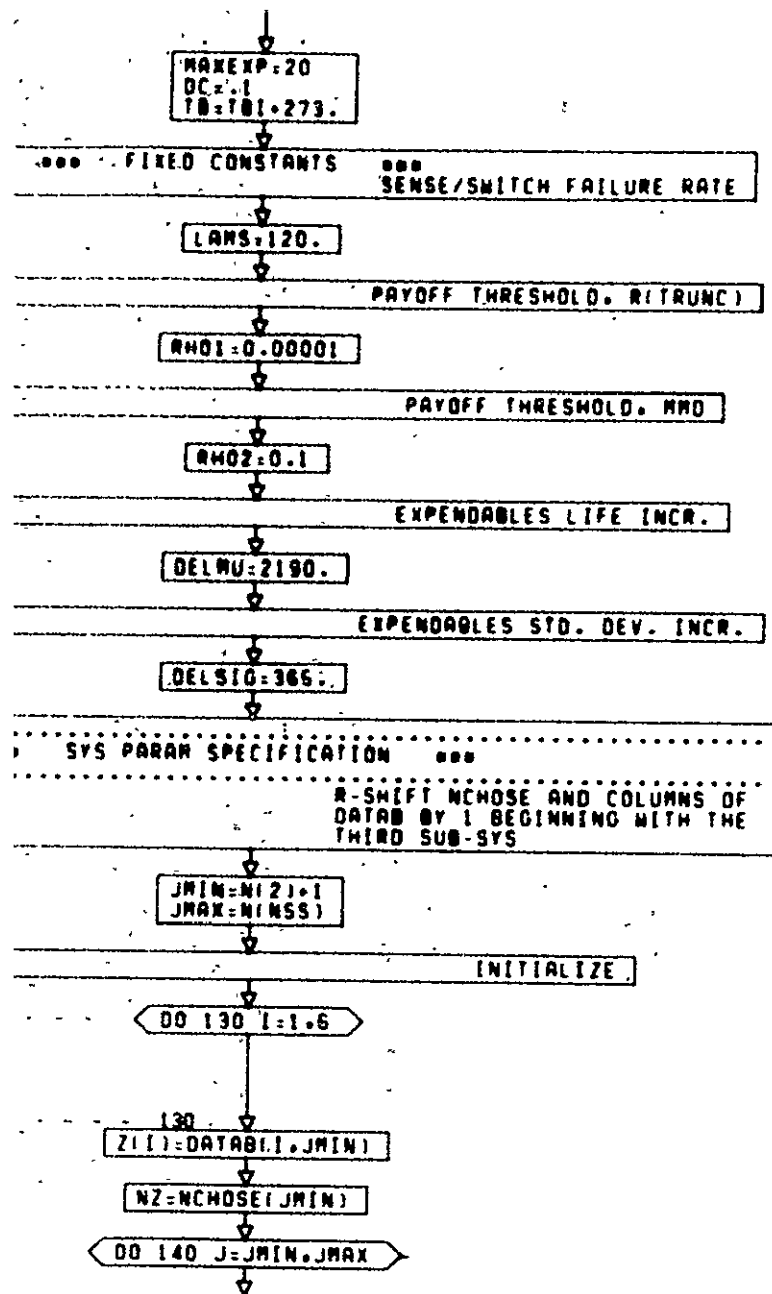
C      D          DEPTH OF DISCHARGE (BETWEEN 0 AND 100)       OTHER
C      NC         TOTAL NUM OF CELLS (ALL BATTERIES)           OTHER
C      PARAMETERS NECESSARY TO COMPUTE THE CYCLES/HR FACTOR   SAC
C      NOW FIXED AT 4.0E-11, REF MODEL 5

```

EMU=TRUNC  
ESIG=TRUNC/6.

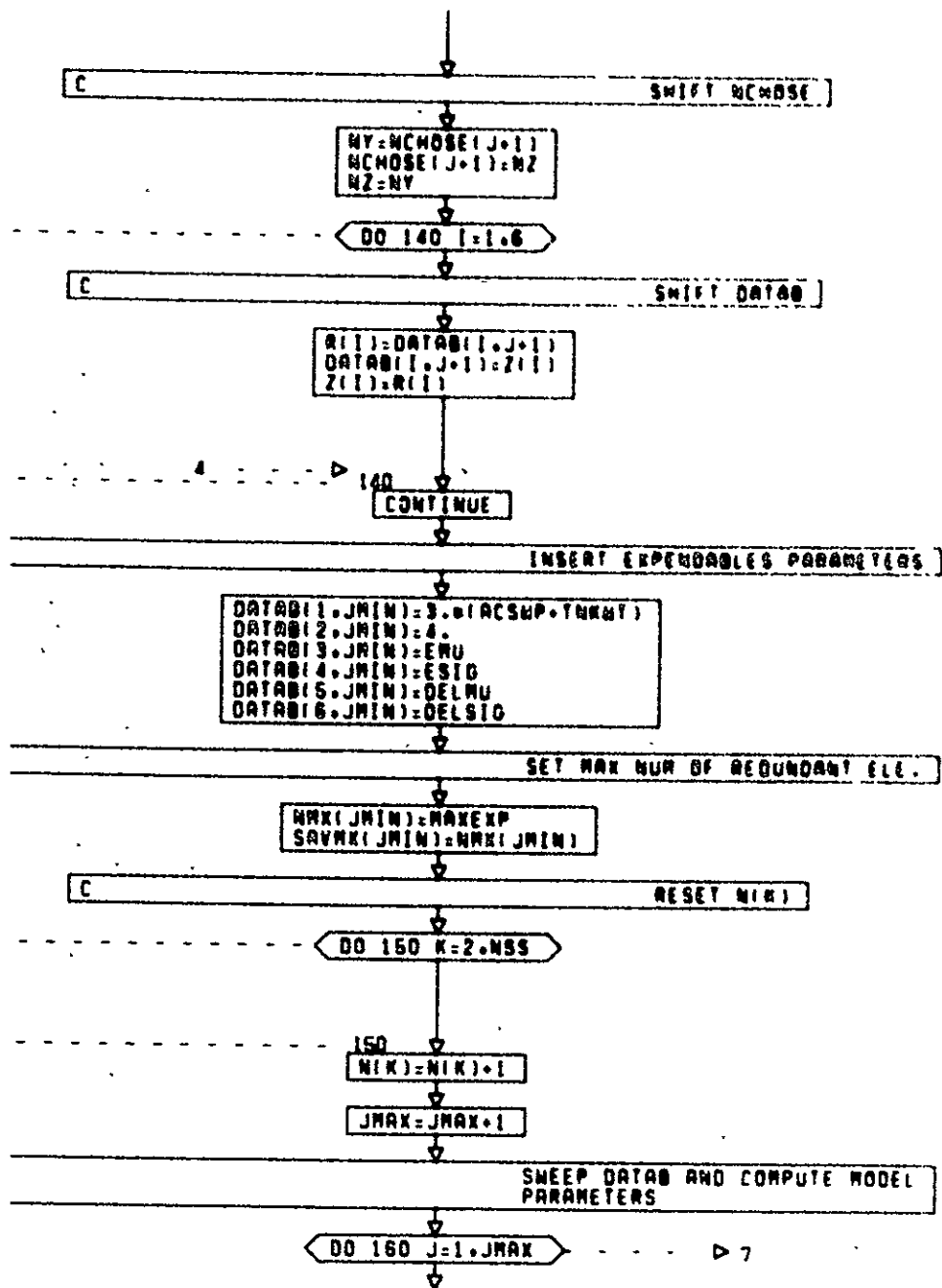
CONT. ON PG 4





CONT. ON PG

PG 4 OF 24

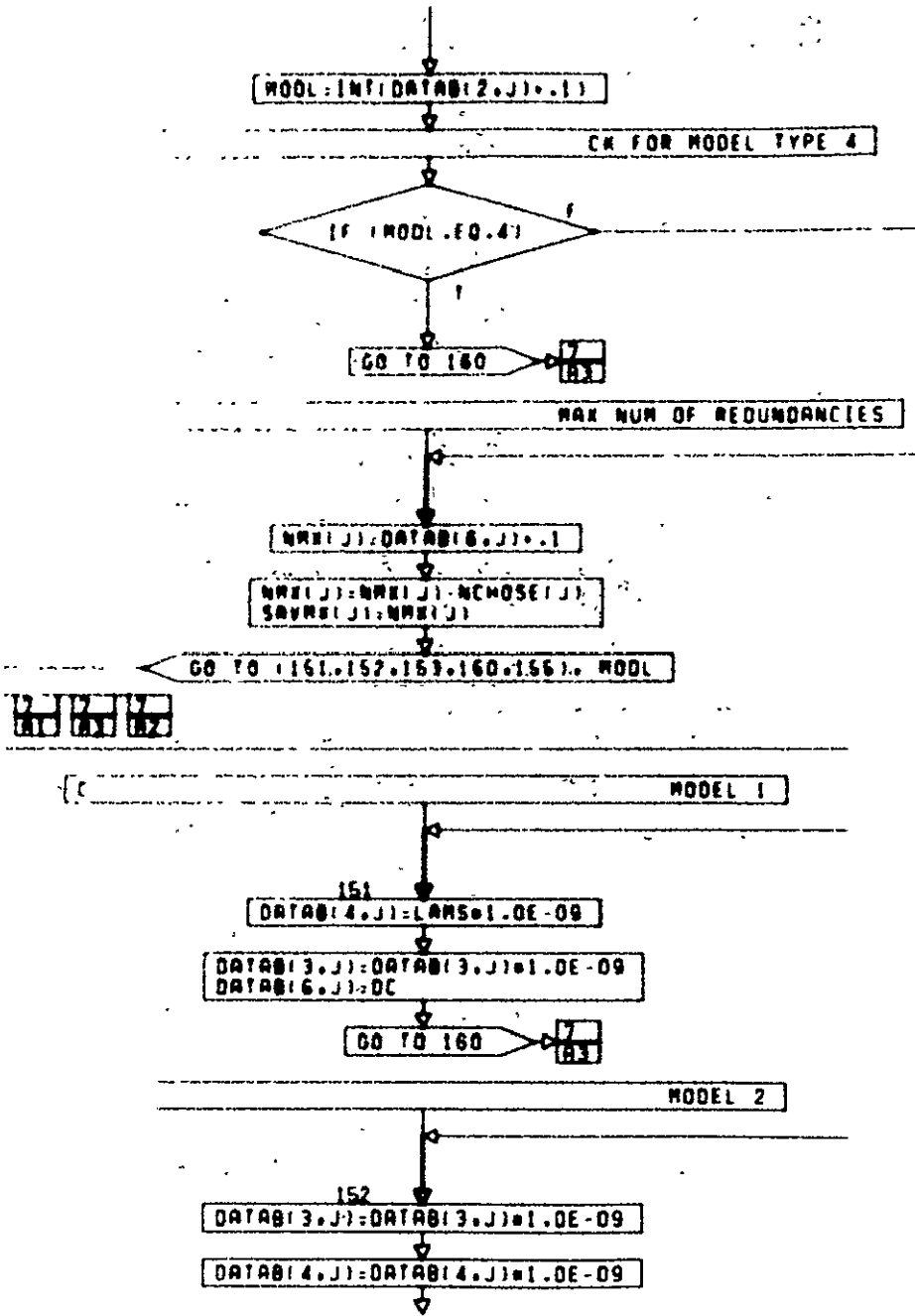


CONT. ON PG 6

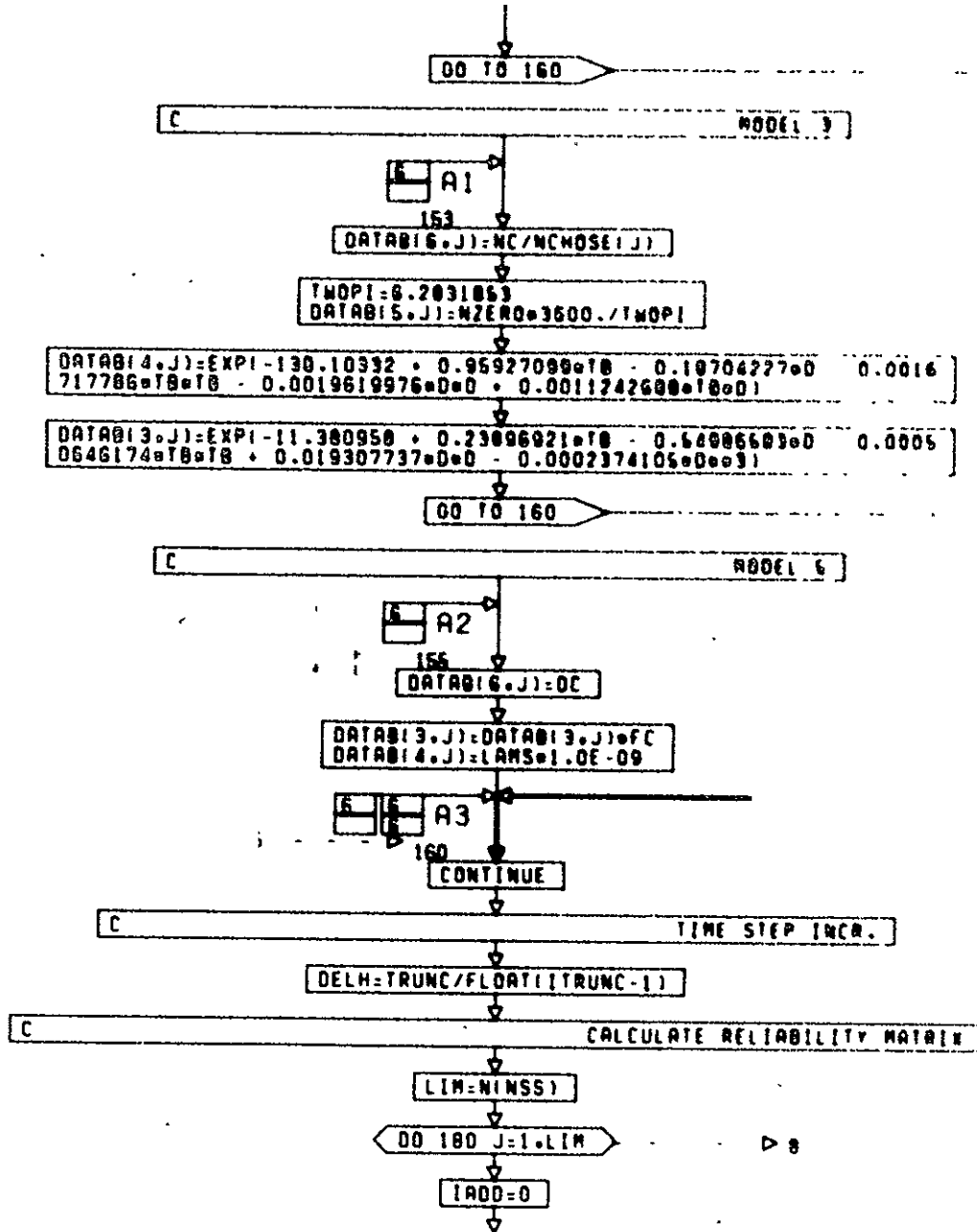
PG. 5 OF 24

ORIGINAL PAGE IS  
OF POOR QUALITY

10-323

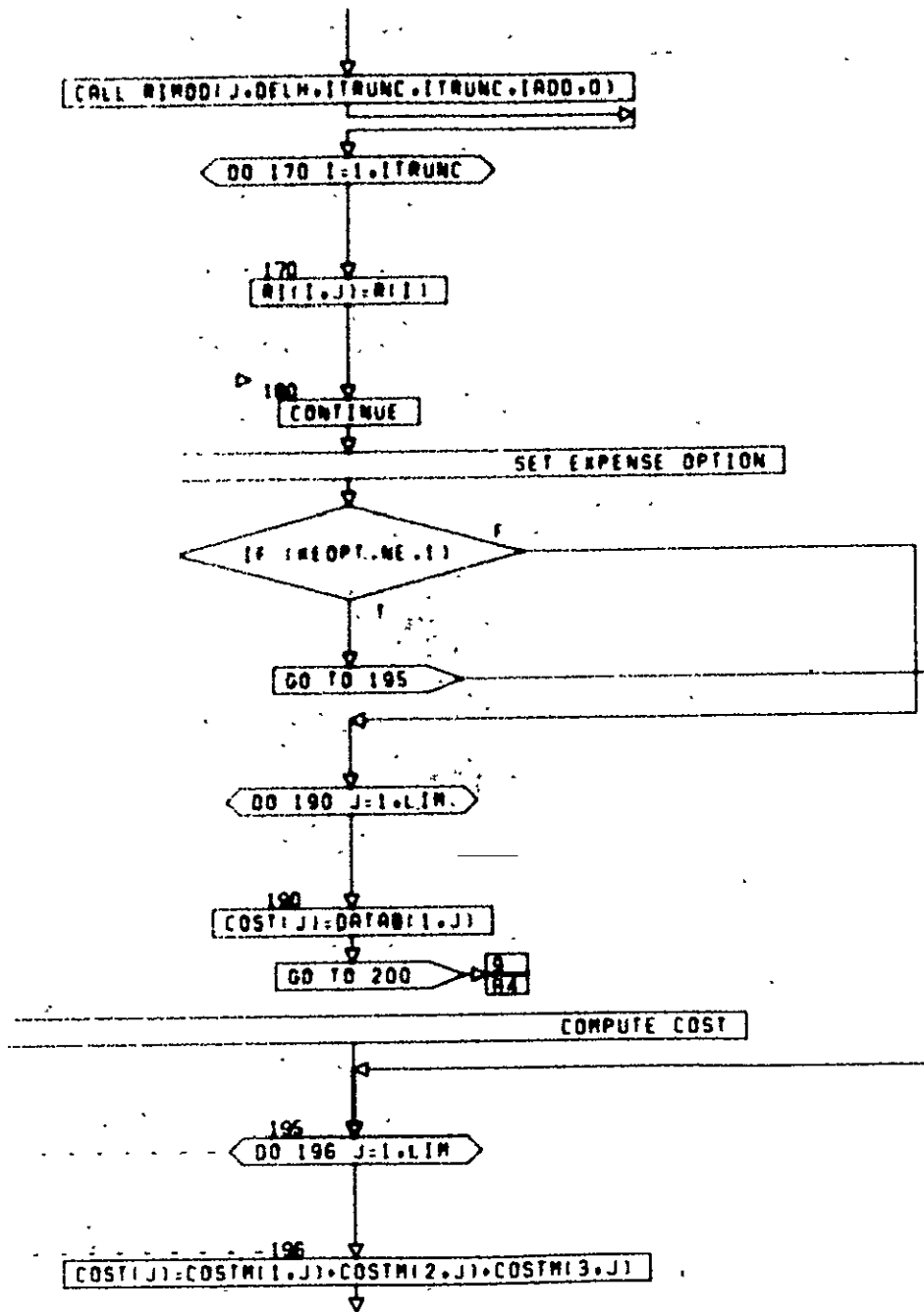


CONT. ON PG 7



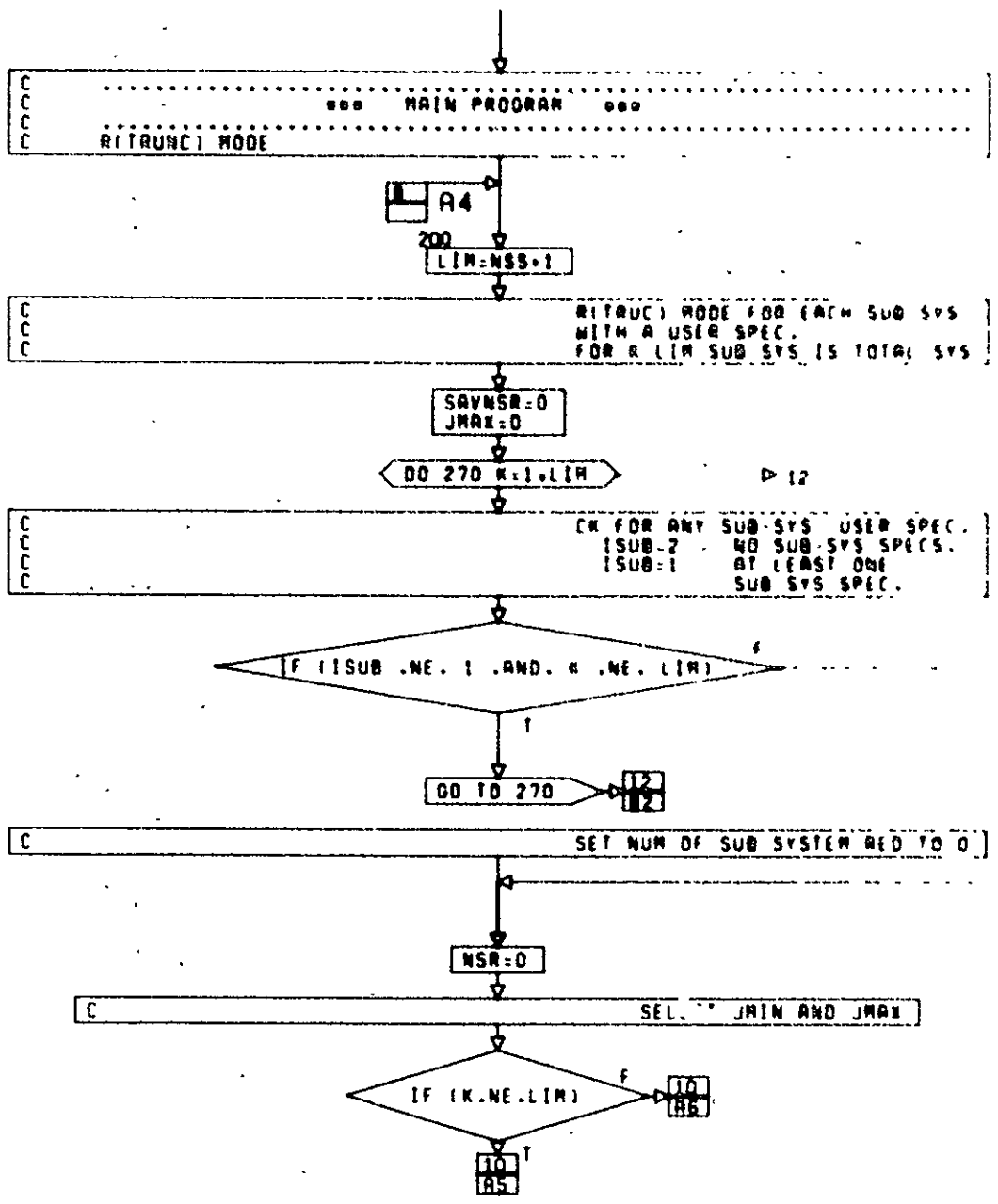
CONT. ON PG 8

PG. 7 OF 24



CONT. ON PG 9

PG 8 OF 24

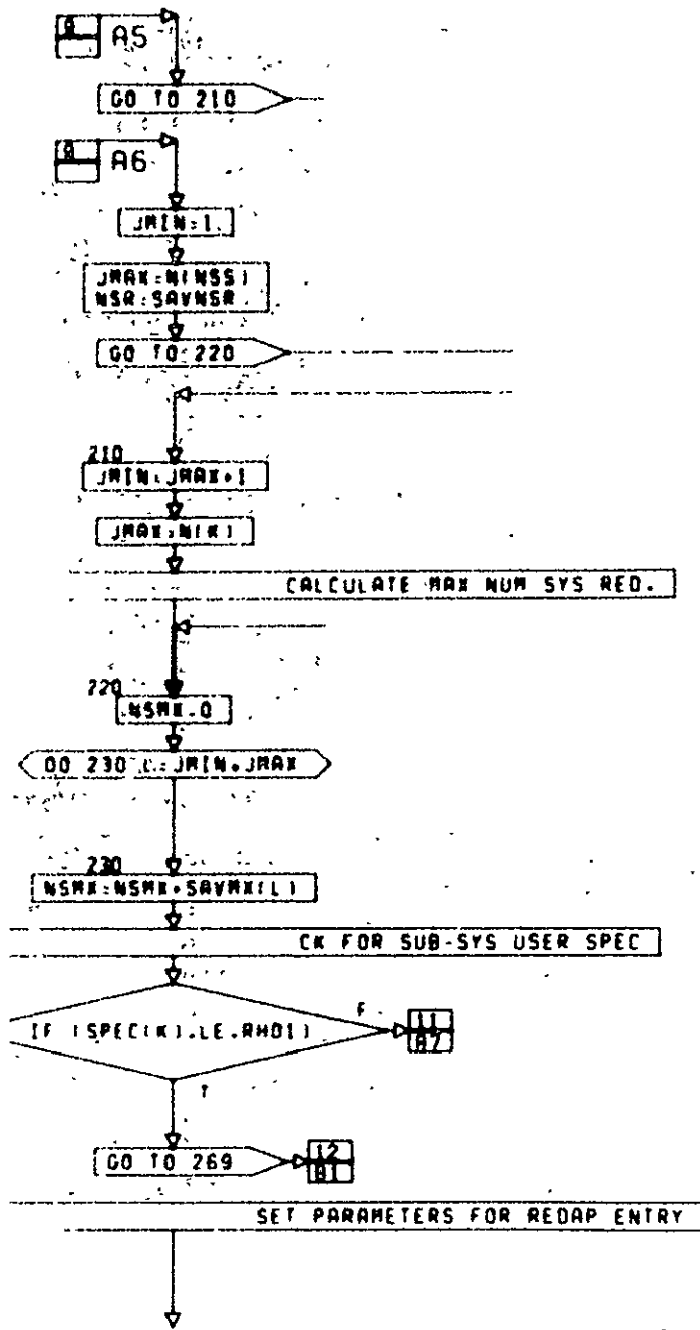


CONT. ON PG 10

PG 9 OF 24

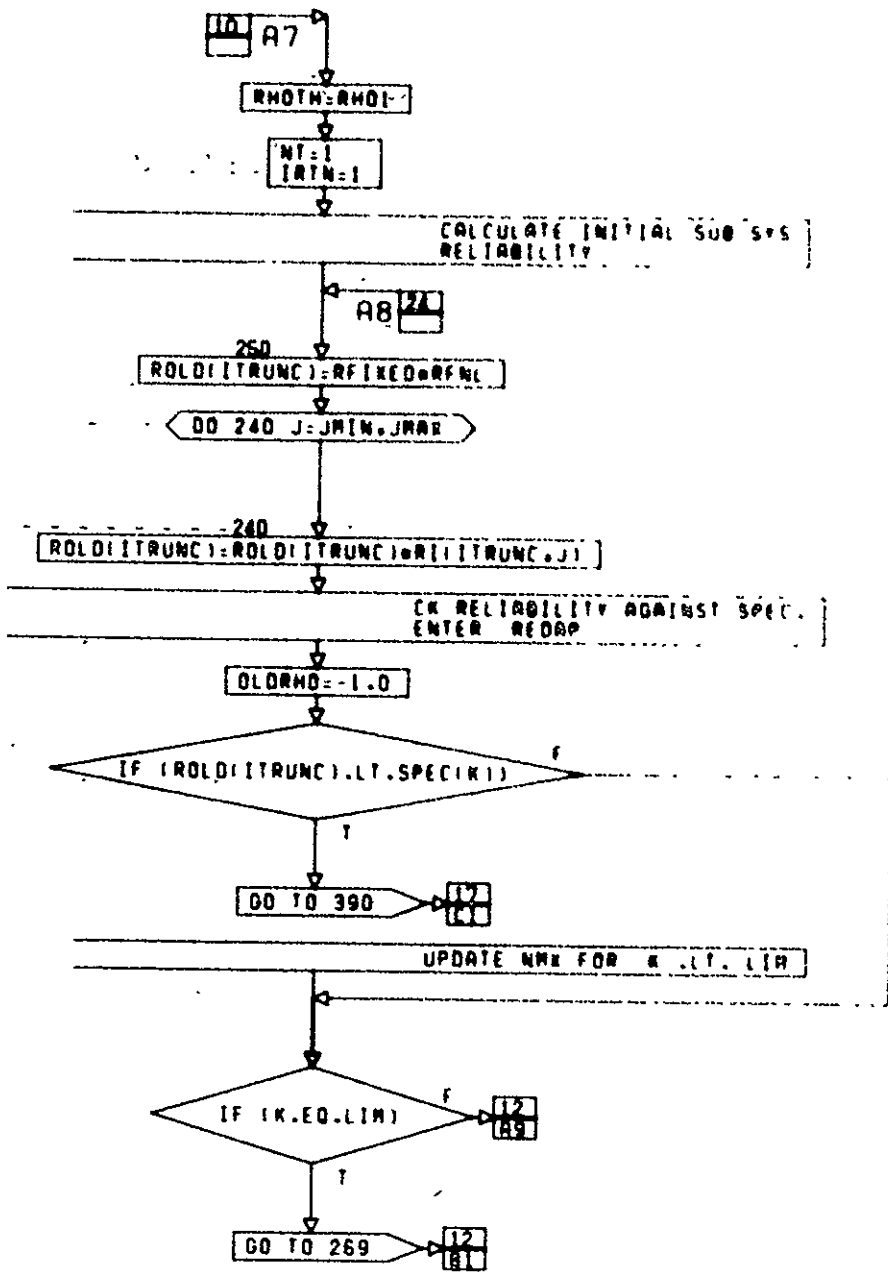
ORIGINAL PAGE IS  
OF POOR QUALITY

10-327



CONT. ON PG 11

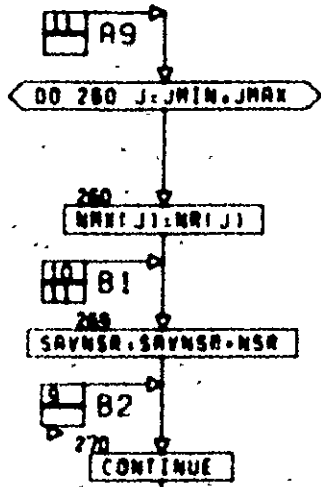
PG 100F 24



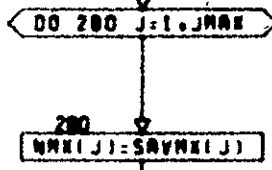
CONT. ON PG 12

PG LDF 24

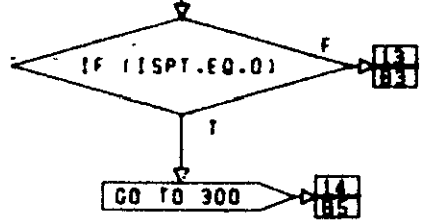




LIST OF EXIT PARAM AND VALUES  
 EXIT AT TRUNC) MODE  
 JMIN=1  
 JMAX=NINSS)  
 NSR= NUM SYS REQ  
 NSMX= MAX NUM SYS REQ  
 NOM ENTER AND DETERMINATION  
 RESET MAX TO TRUE LIMITS



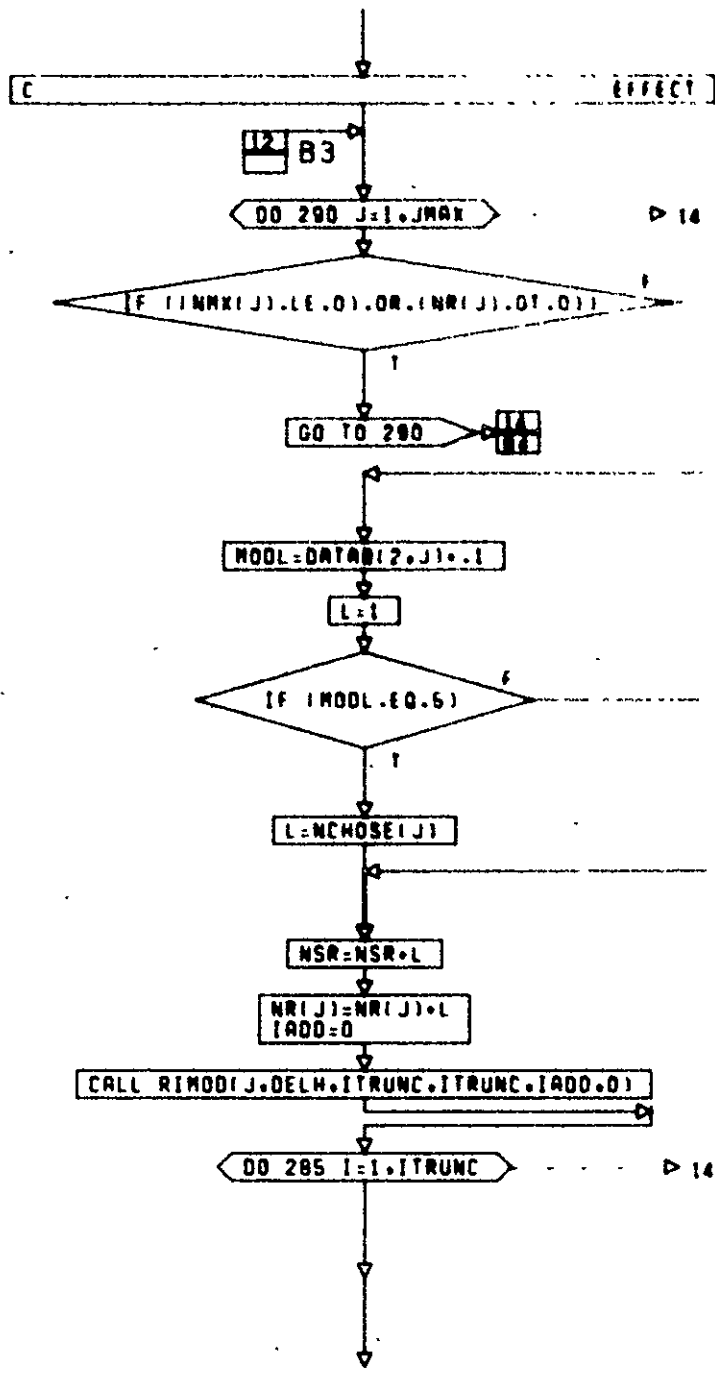
200 ENTRY TO AND DETERMINATION  
 CK FOR SINGLE POINT FAILURE  
 REQUIREMENT  
 ISPT=0 NO REQ.  
 =1 REQ.



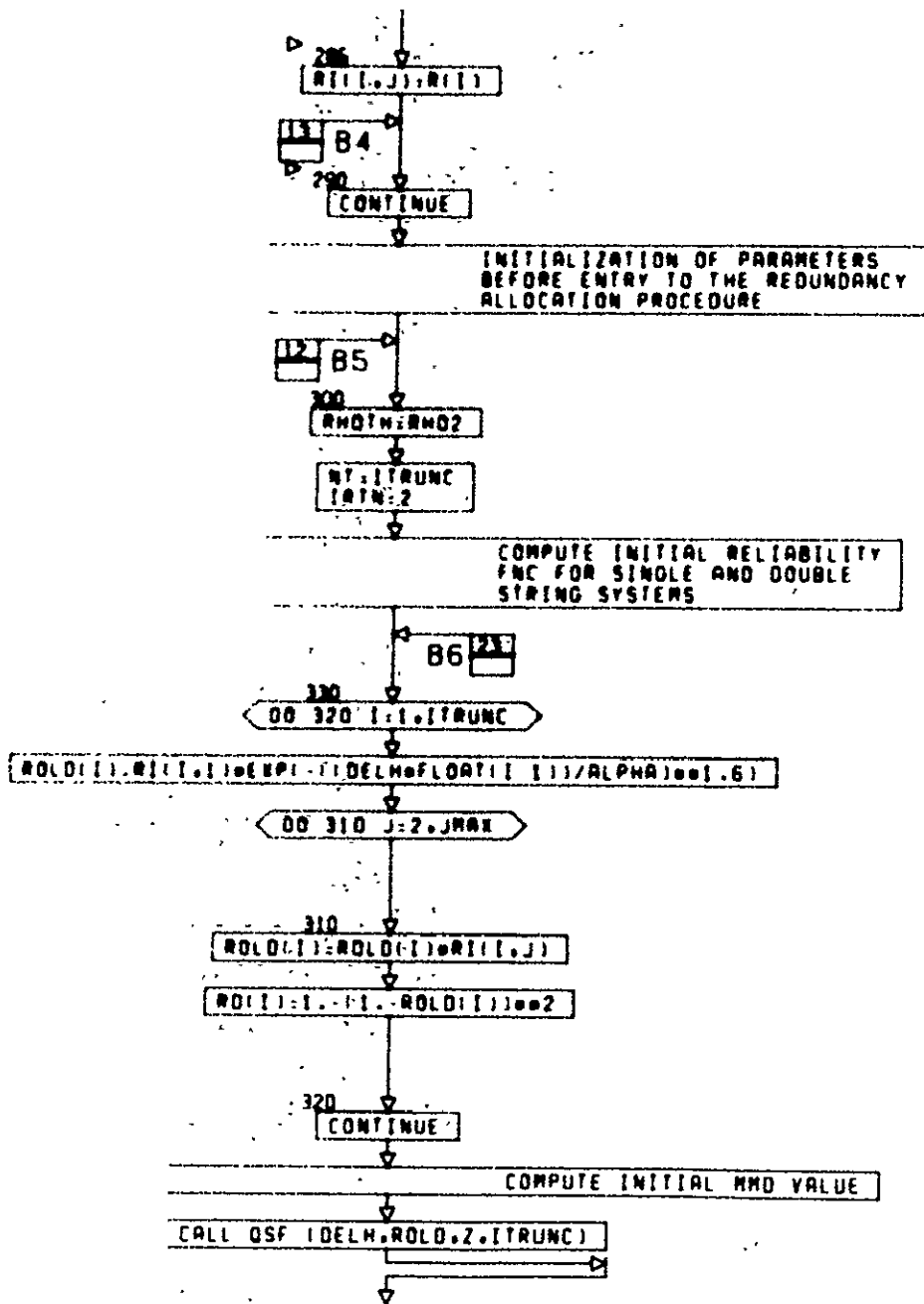
SINGLE POINT FAILURE REQ. IN

CONT. ON PG 13

PG 12F 24

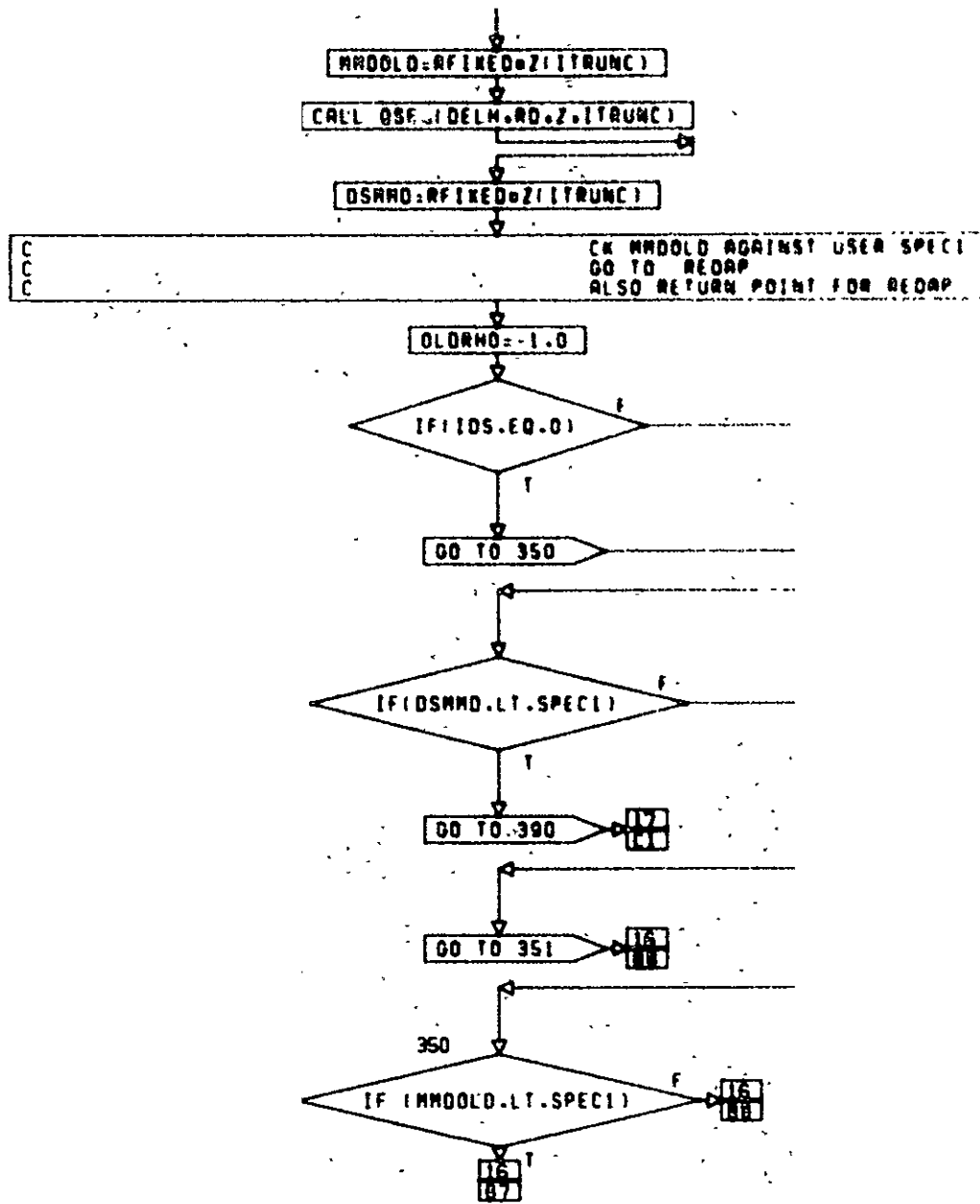


CONT. ON PG 14



CONT. ON PG 15

PG 1 OF 24

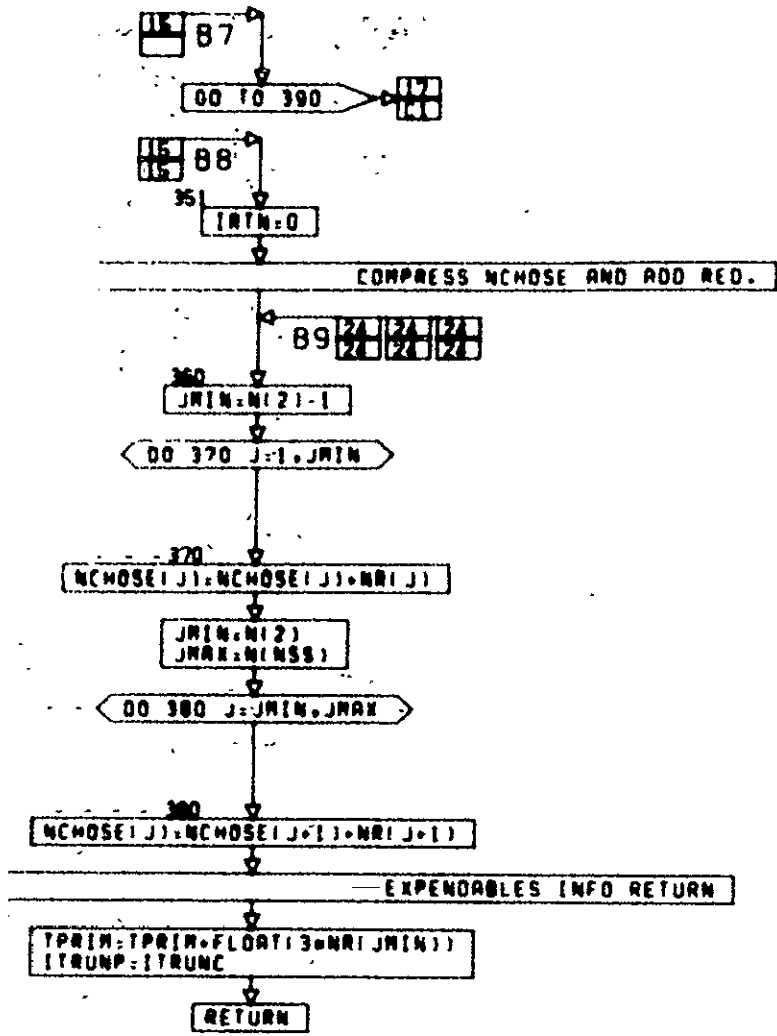


CONT. ON PG 16

PG 15F 24

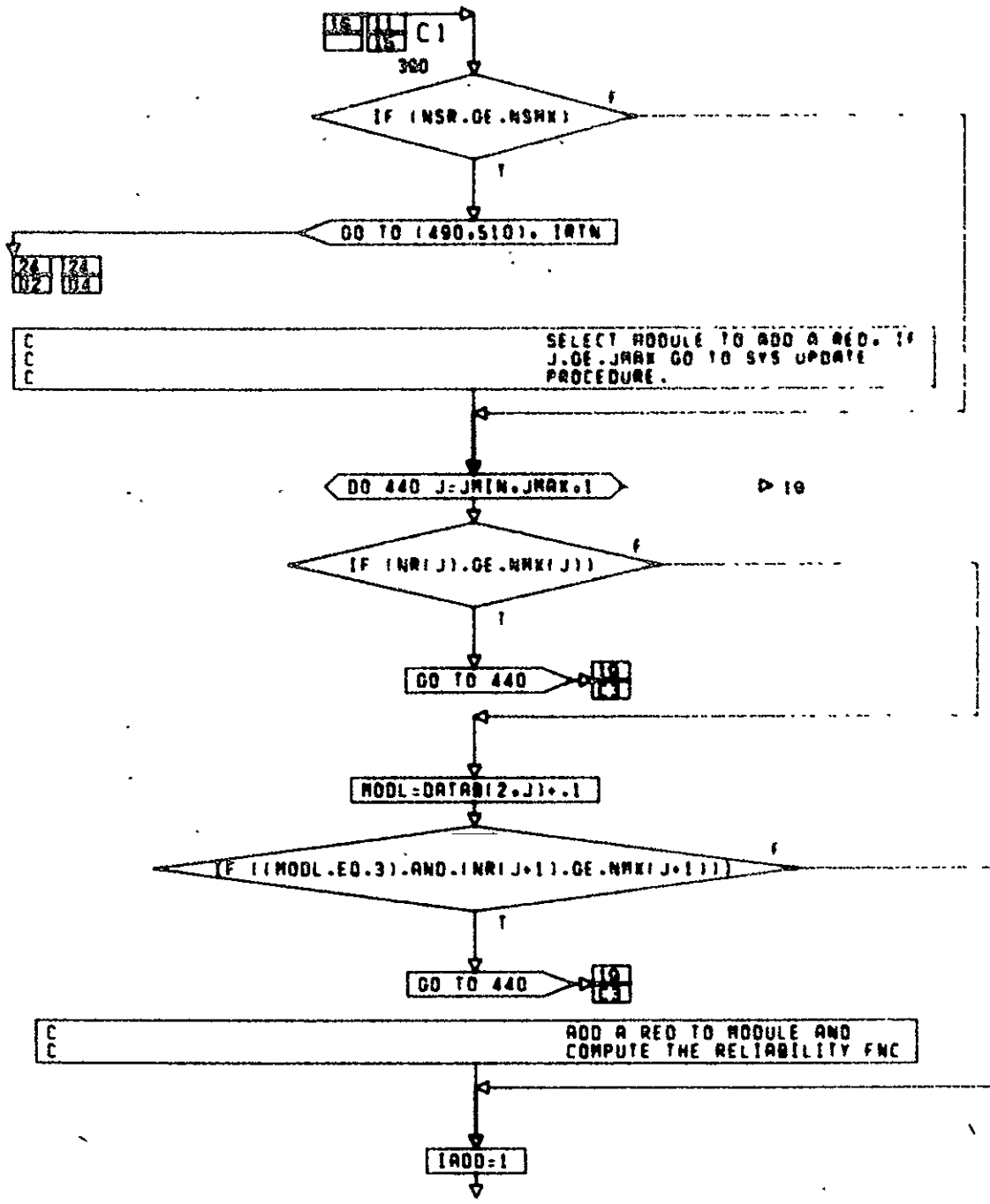
10-333

ORIGINAL PAGE IS  
OF POOR QUALITY



```

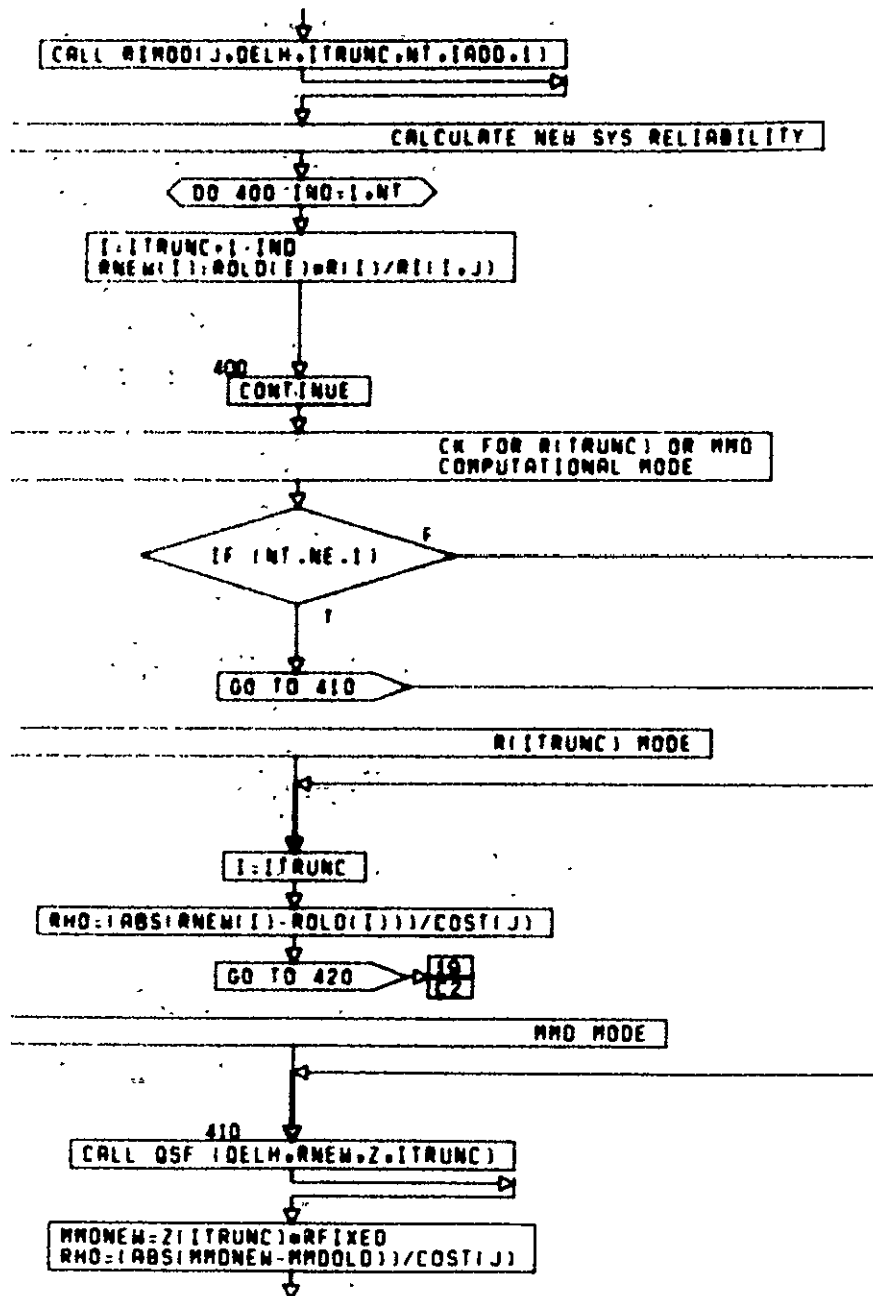
    .....
    *** MAIN REDUNDANCY ALLOCATION PROCEDURE ***
    (REDAP)
    .....
    IF MAX NUM RED EXCEEDED, RETRN
    OTHERWISE CONTINUE PROCEDURE
  
```



CONT. ON PG 18

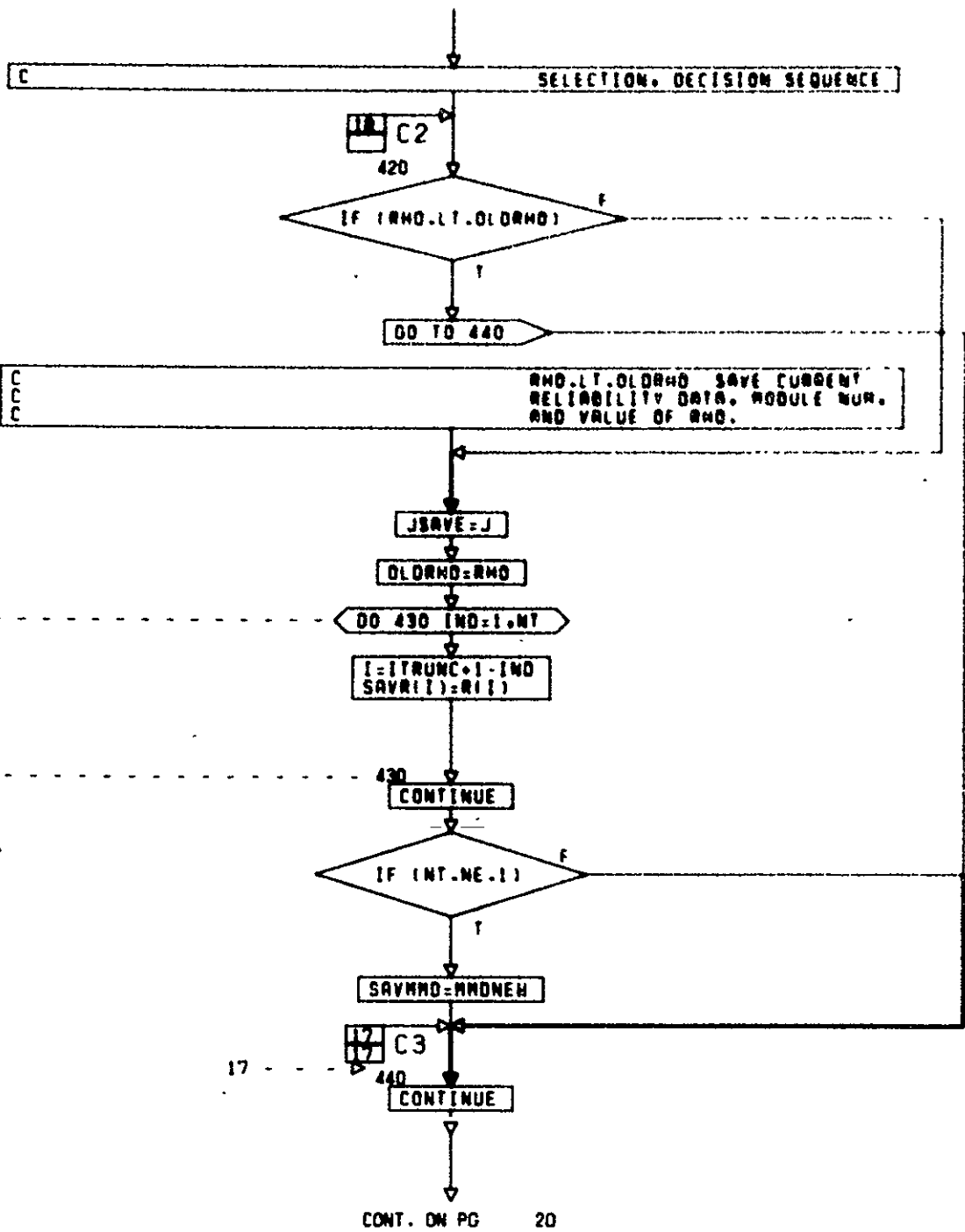
PG 17F 24

100  
ORIGINAL PAGE IS  
OF POOR QUALITY



CONT. ON PG 19

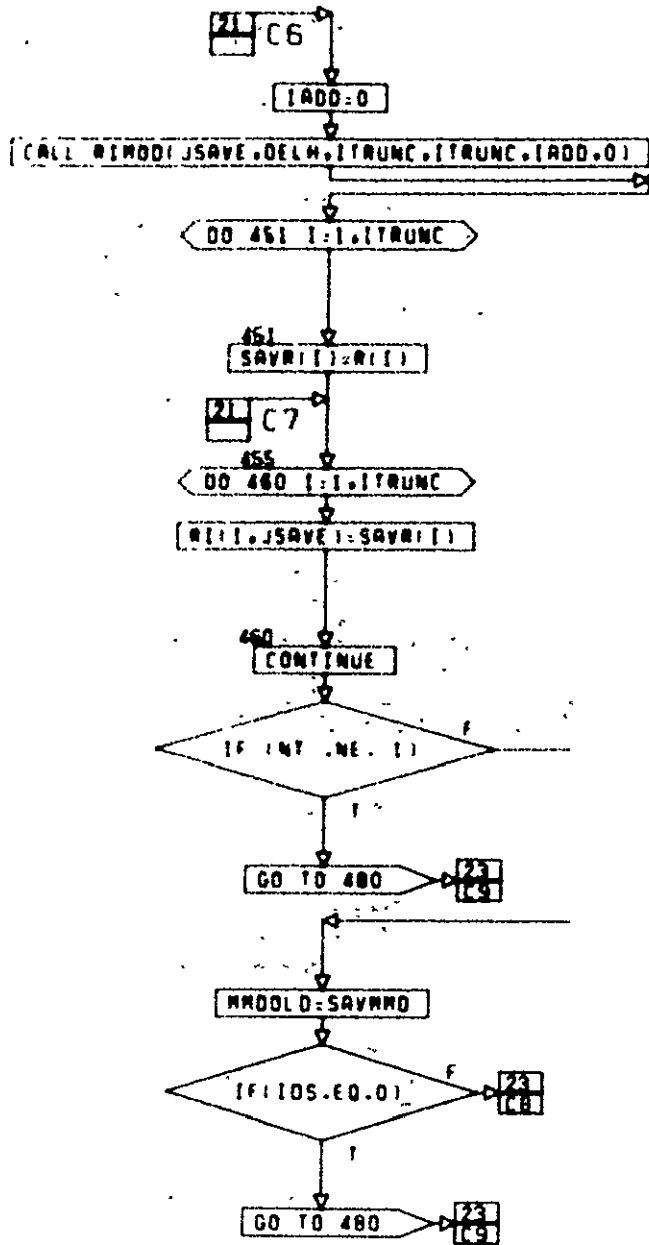
PG 18 OF 24





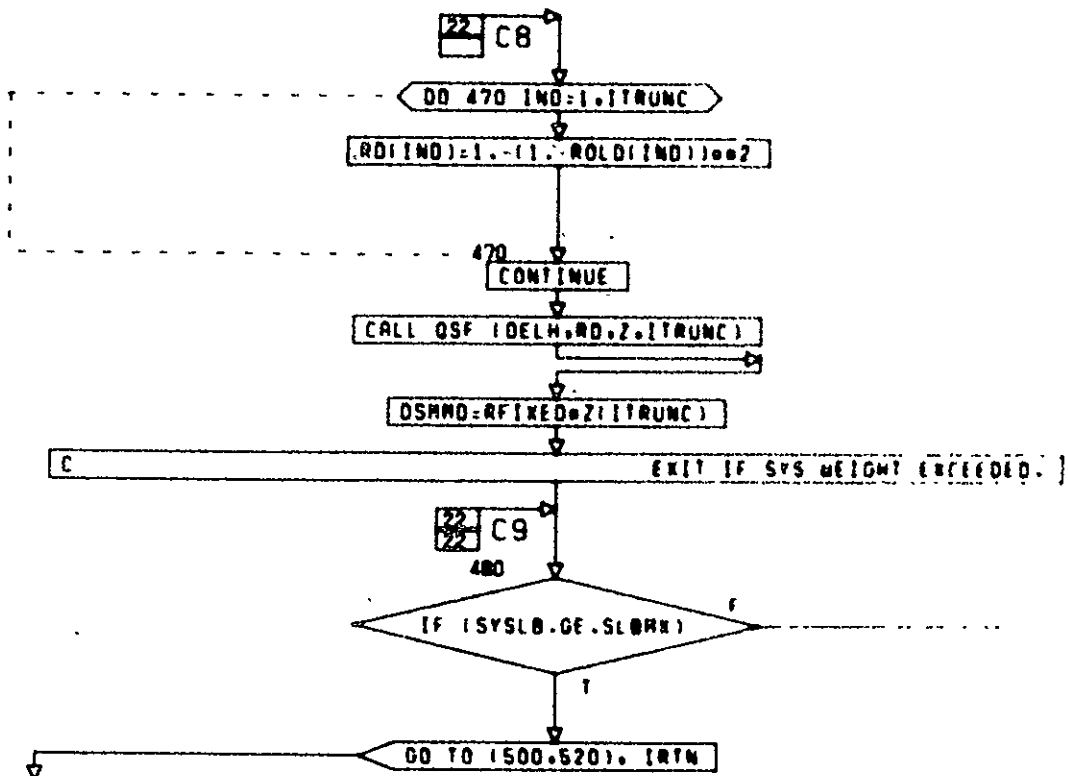






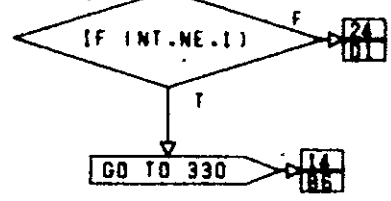
CONT. ON PG 23

PG 22F 24



24 24  
03 05

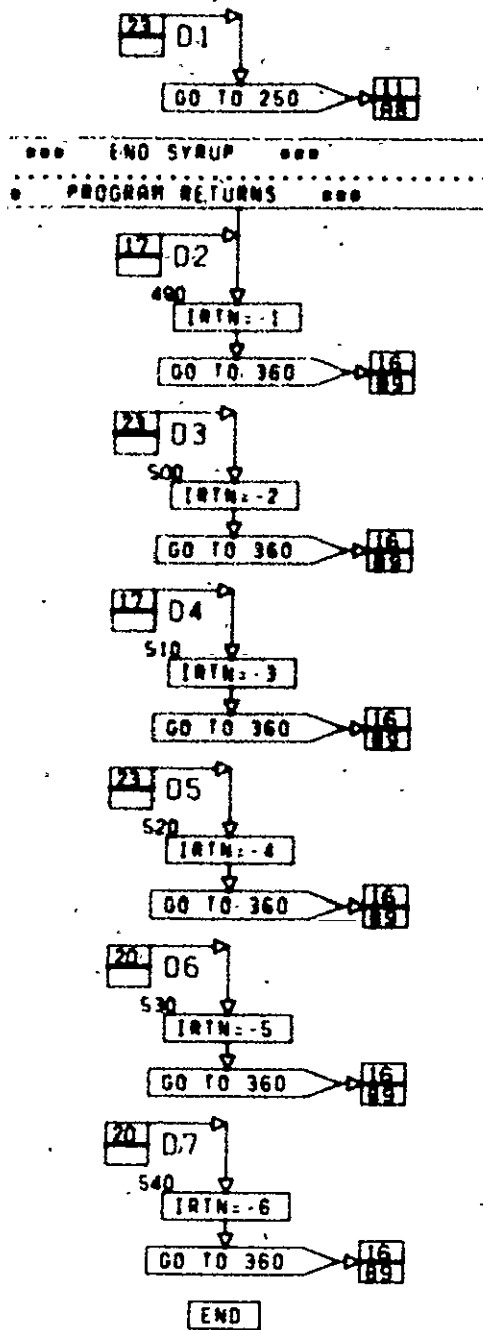
C	BRANCH TO START ANOTHER PASS
C	THRU READP
C	MODE NT STMT NUM
C	R (ITRUNC) I 250
C	RND ITRUNC 330



CONT. ON PG 24

PG 23F 24

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OF POOR QUALITY



PG 24 FINBL

C .....

SUBROUTINE RIADD(J,DELH,(ITRUNC,NT,(IADD,(IOPT))

COMMON /CHOSE/(CHOSE(60),NCHOSE(60),COSTM(5,60),SYSPAR(6,60),  
THM(4,60),DPIA(11,60),SKD(7,60)

COMMON /DBCOM/(RI(31),NR(60),R(31,60),M(31),RD(31),RDUR(31),SAVR(31),  
SAVRNW(31),RNEW(31),NMX(60),SAVMX(60),COST(60),QUM(256))

COMMON /PRTCOM/ACCRCY,CSTAR,(REL,MDOLO,TRUNC,(TRUMP,DE,TE,  
TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMF,SATR,SATINV,WEA,  
MEINV,PAYR,PAUINV,PAYQUL,GSE,XTOT,CTOT,FEER,FEIINV,DDTE,KVEST,  
DPS,SKTAU(6),ROLD(60),TSRT,AN,TS,DS,AM,TF,BF,TC,TA,TB,TOTOPS

REAL LAN,LAMBDA,LANS

.....  
SUBROUTINE RIADD  
PURPOSE  
TO COMPUTE THE RELIABILITY FUNCTION FOR MODULE J AFTER  
REDUNDANCIES ARE ADDED TO THE MODULE.  
USAGE  
CALL RIADD(R, NR, J, DELH, (ITRUNC, NT, (IADD, IOPT))  
DESCRIPTION OF PARAMETERS

C J - INPUT MODULE NUM  
C DELH - DELTA TIME, THE TIME INCREMENT  
C ITRUNC - THE NUM OF TIME POINTS  
C NT - INPUT OPTION PARAMETER  
C IADD - INPUT OPTION PARAMETER  
C IOPT - INPUT OPTION PARAMETER  
C REMARKS  
C OPTION PARAMETER VALUE ACTION

C NT 1 ONLY COMPUTE RELIABILITY AT  
C ITRUNC TRUNCATION TIME. RETURN VALUE IN  
C IADD 0 COMPUTE RELIABILITY AT EACH TIME  
C 1 RETURN VALUES IN R.  
C ADD NO REDUNDANCIES BEFORE COM-  
C PUTING THE RELIABILITY FUNCTION.  
C ADD REDUNDANCIES BEFORE COMPUT-

C IOPT 0 ING THE RELIABILITY FUNCTION.  
C OTHER UNCOUPLE MODELS 1 AND 3.  
C COUPLE MODELS 1 AND 3.  
GLOBAL VARIABLES PASSED THROUGH COMMON  
R - THE RESULTING RELIABILITY FUNCTION  
NR - INPUT VECTOR OF THE NUM OF REDUNDANCIES BY MODULE  
NCHOS - INITIAL NUM OF ELEMENTS IN MODULES  
SYSPAR - MATRIX OF MODEL PARAMETERS

C SYSPAR(2,J)= MODEL ID FOR J-TH MODULE

CONT. ON PG 2

PG 1 OF 14

```

C
C   FOR FURTHER DESCRIPTION SEE COMMENTS PRECEDING THE
C   PARTICULAR MODEL OF INTEREST.
C   SUBROUTINES AND SUBPROGRAMS REQUIRED
C   FORTRAN SYS FNCSZ EXP, FLOAT, INT, SORT
C   EXTERNAL FNCSZ GAM, GAMMA FNC, CERF=ERROR FNC
C   SUBROUTINESZ NONE
C

```

```

ROOT2=SQRT(2.0)
MOD:INT(SYSVAR(2,J)+.1)

```

```

GO TO (10,80,120,160,10), MOD

```



```

C
C   MODELS 1 AND 6
C   VARIABLES      SIZE      ORIGIN      DEFN
C   LANS           1         INT       SENSE/SWITCH FAILURE RATE
C   LAN            1         INT       FAILURE RATE
C   Q              1         INT       DORMANCY FACTOR
C   DC             1         INT       MODULE DUTY CYCLE
C   RI             1         INT       NUM OF STANDBY ELEMENTS
C

```

```

C
C   NI             1         INT       NUM OF ACTIVE ELEMENTS
C   SYSPAR         1..J      GLOBAL    MODEL PARAMETERS FOR J-TH
C                                     MODULE
C                                     1=3  VALUE OF LAN
C                                     1=4  VALUE OF LANS
C                                     1=5  VALUE OF Q
C                                     1=6  VALUE OF DC
C

```

```

RI 12

```

```

10
LAN=SYSPAR(3,J)

```

```

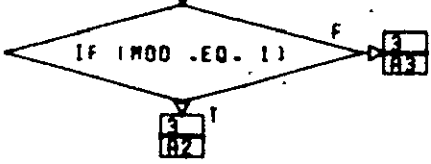
LANS=SYSPAR(4,J)
Q=SYSPAR(5,J)
DC=SYSPAR(6,J)
NREQ=NCHOSE(1,J)
NRED=NR(1,J)

```

```

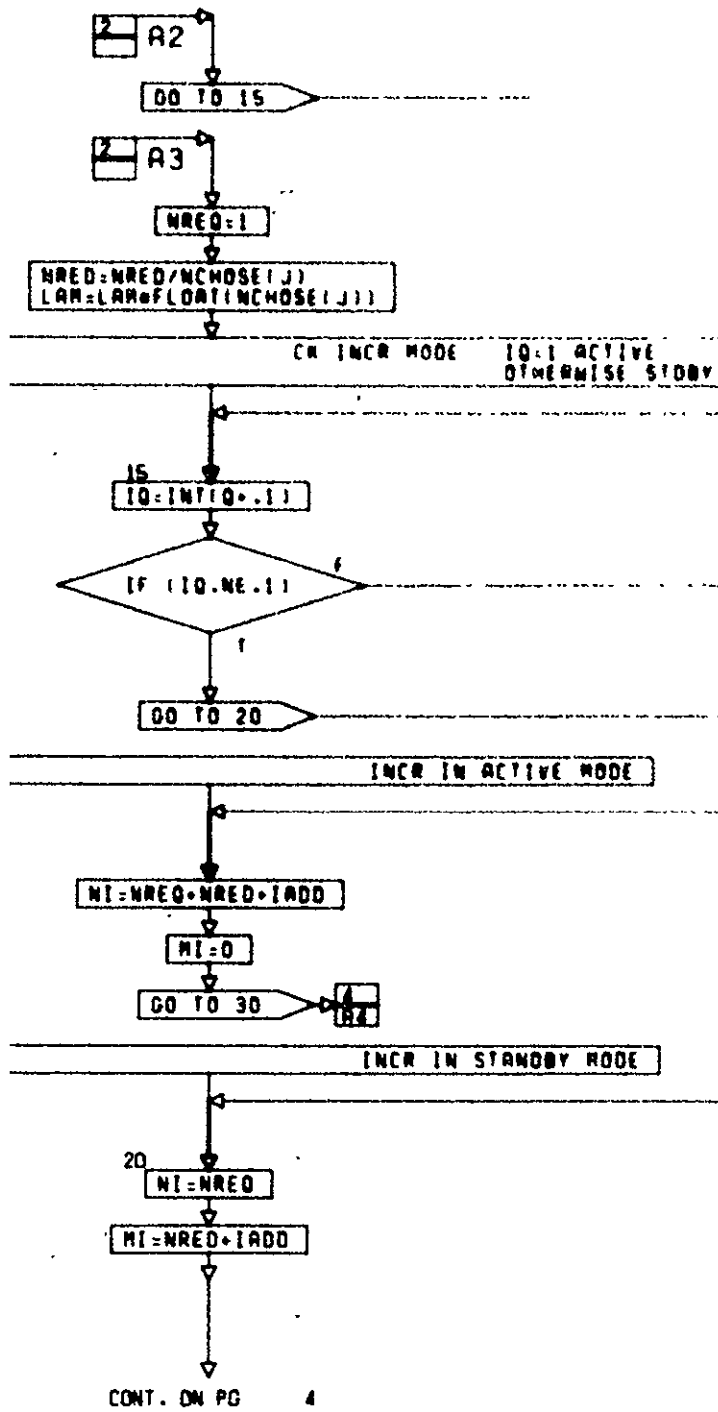
C
C   CK MODEL TYPE
C

```

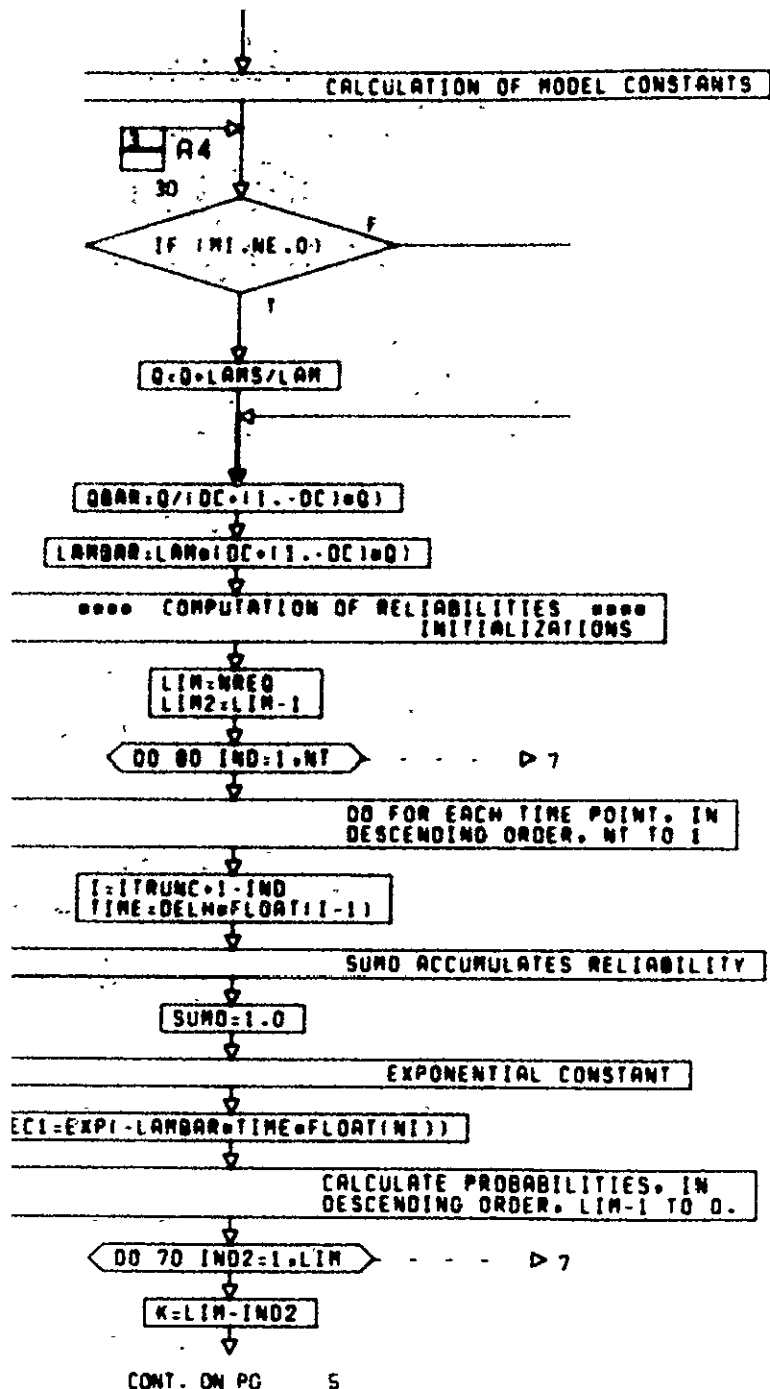


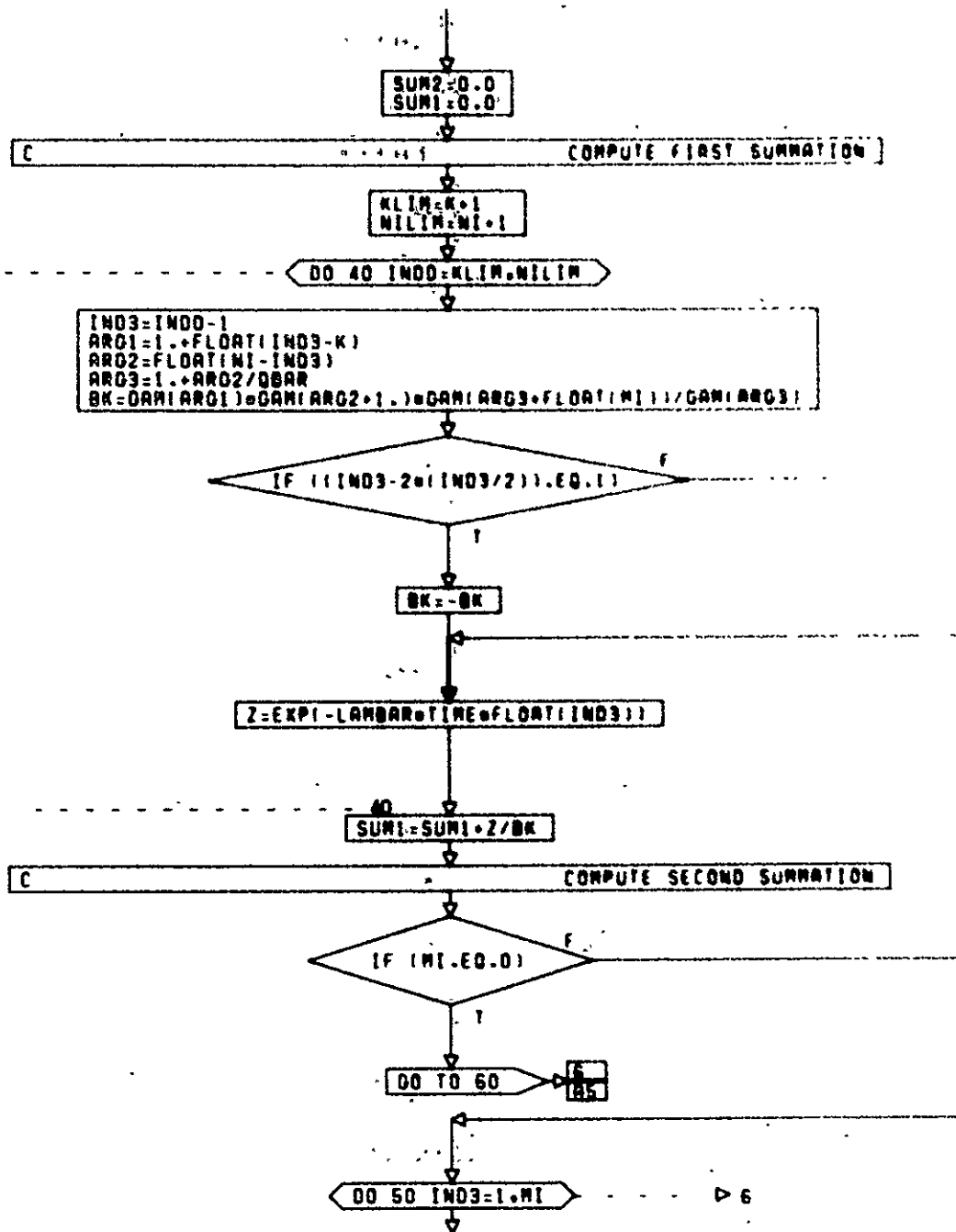
CONT. ON PG 3

PG 2 OF 14

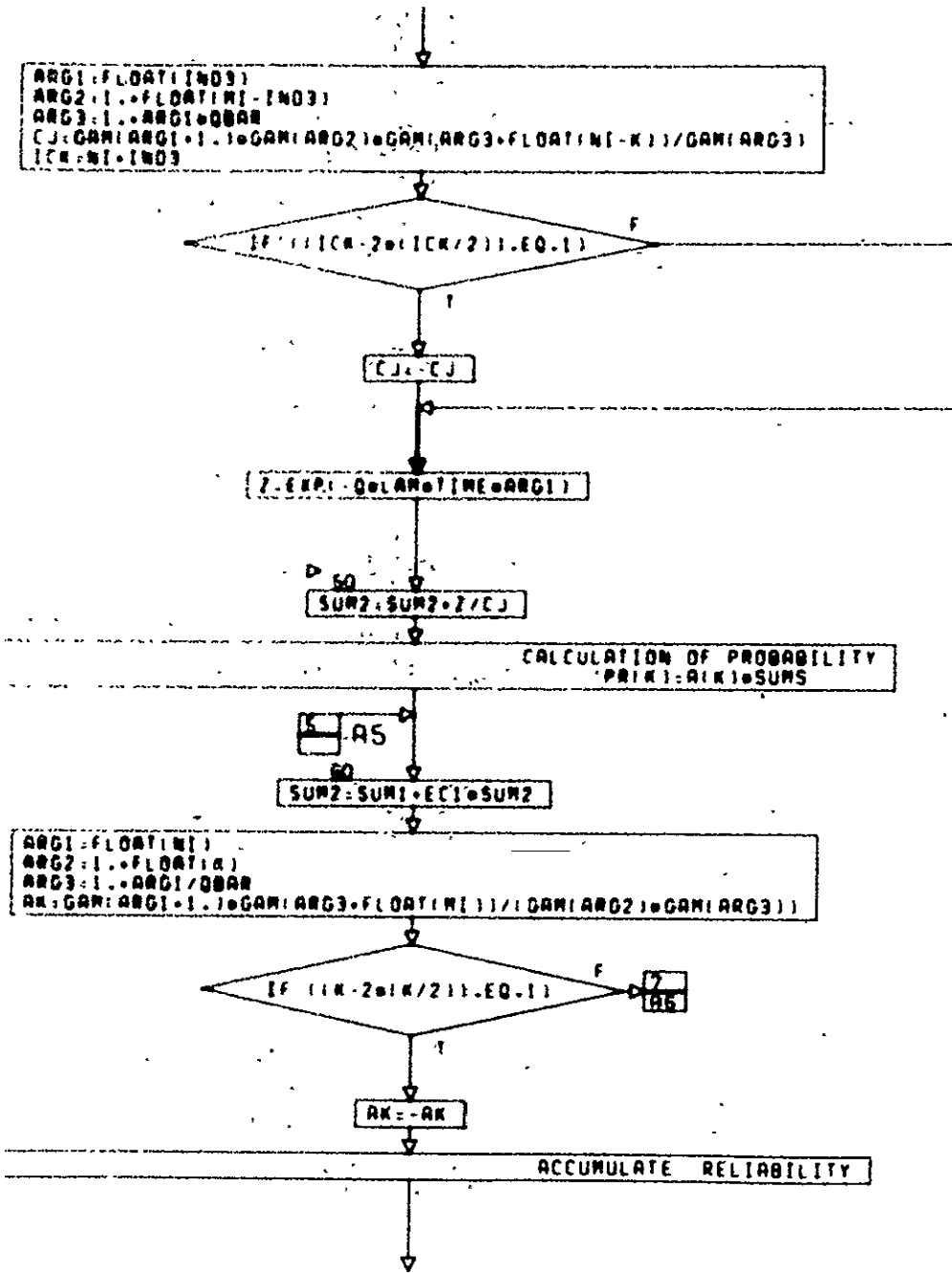




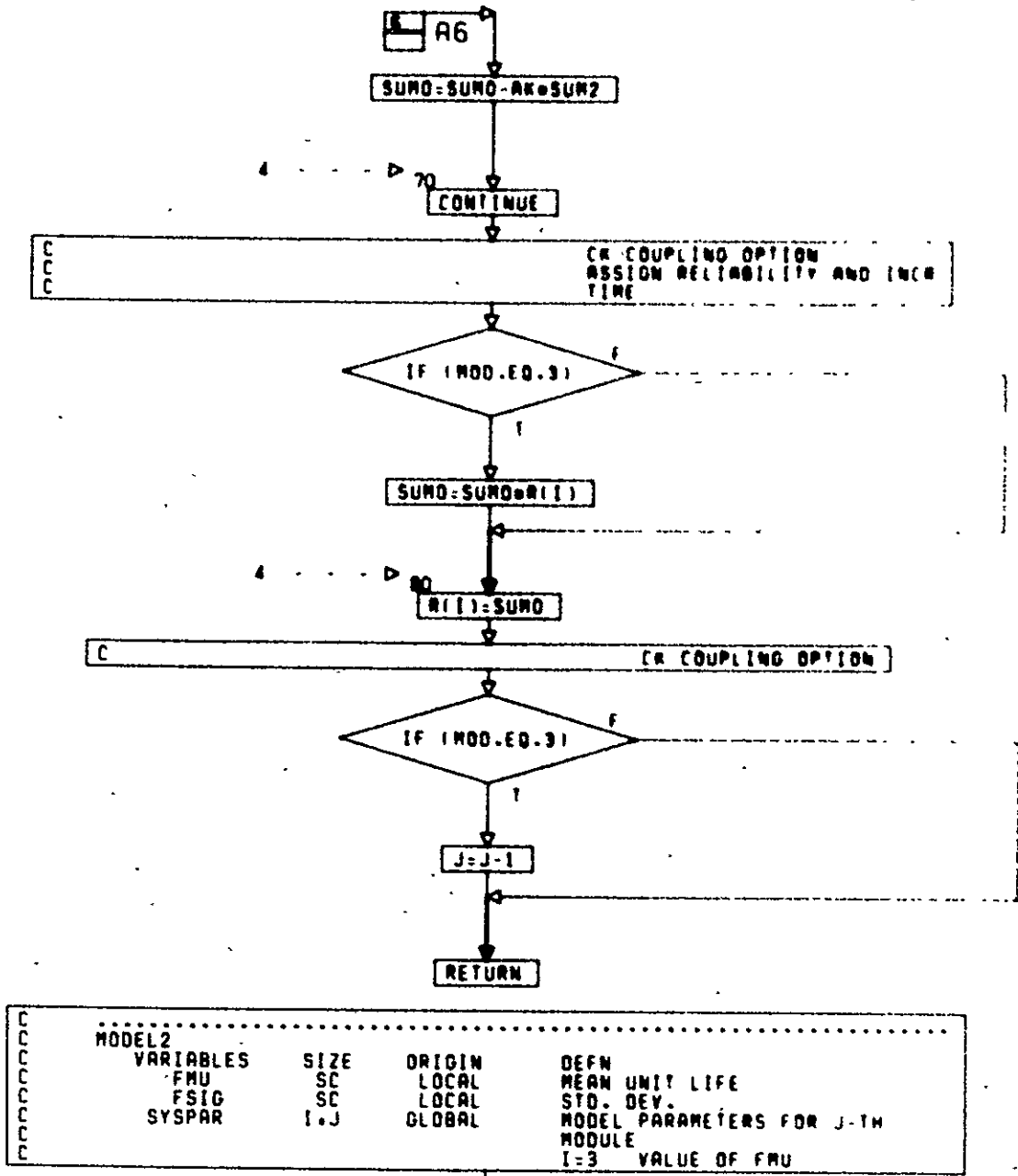




CONT. ON PG 6



CONT. ON PG

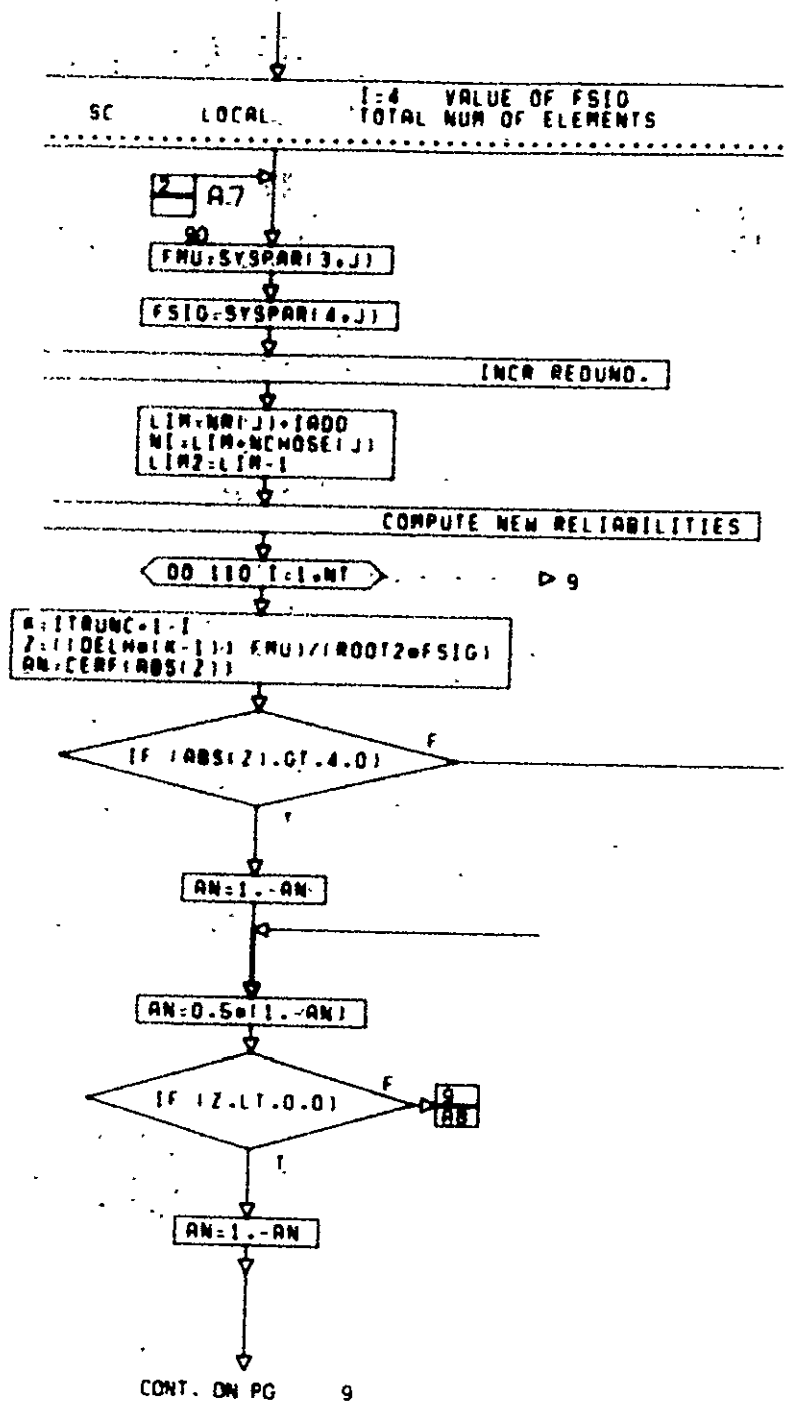


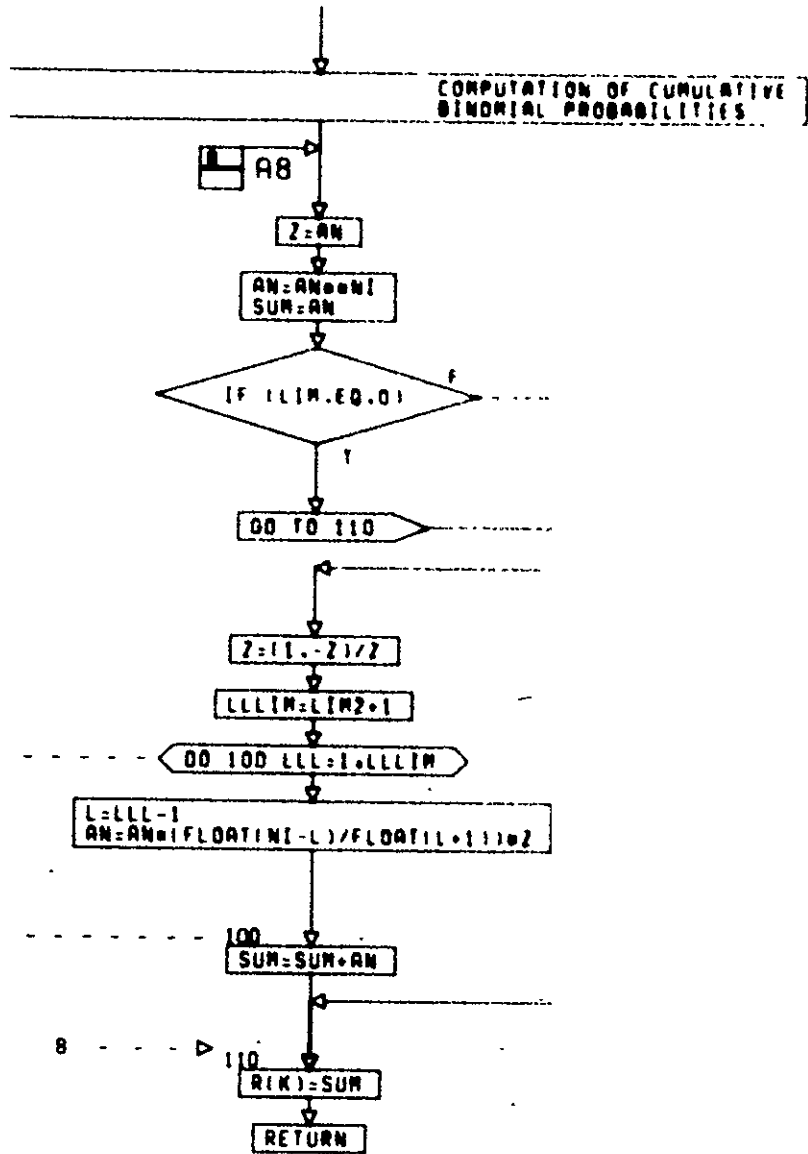
CONT. ON PG 8

PG 7 OF 14

201  
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10-349





MODEL3	VARIABLES	SIZE	ORIGIN	DEFN
AB	SC	LOCAL	BATTERY CELL CONSTANT	

CONT. ON PG 10

PG 9 OF 14

ORIGINAL BATTERY  
FOR POOR QUALITY

BB	SC	LOCAL	BATTERY CELL CONSTANT
BCYC	SC	LOCAL	CYCLE RATE OF BATTERY
NI	SC	LOCAL	TOTAL # OF BATTERIES
NC	SC	LOCAL	NUM OF CELLS IN BATTERY

SYSPAR	I,J	GLOBAL	MODEL PARAMETERS FOR J-TH MODULE
			I=3 VALUE OF AB
			I=4 VALUE OF BB
			I=5 VALUE OF BCYC
			I=6 VALUE OF NC

2 A9

120 AB:SYSPAR(3,J)

BB:SYSPAR(4,J)  
BCYC:SYSPAR(5,J)  
NC:SYSPAR(6,J)+.1

C INCR REDUND.

L(N-NR1J)+100  
NI=L(N-NC\*OSE(J))  
LIM2=L(N-1)  
LIM3=NC/2  
NC=NC\*LIM3

C COMPUTE NEW RELIABILITIES

DO 140 I=1,NT

▷ 12

K=I\*TRUNC(.1)  
Z=(DELW\*(K-1)-43800.)/(8760.\*RODT2)  
AN=CERF(ABS(Z))

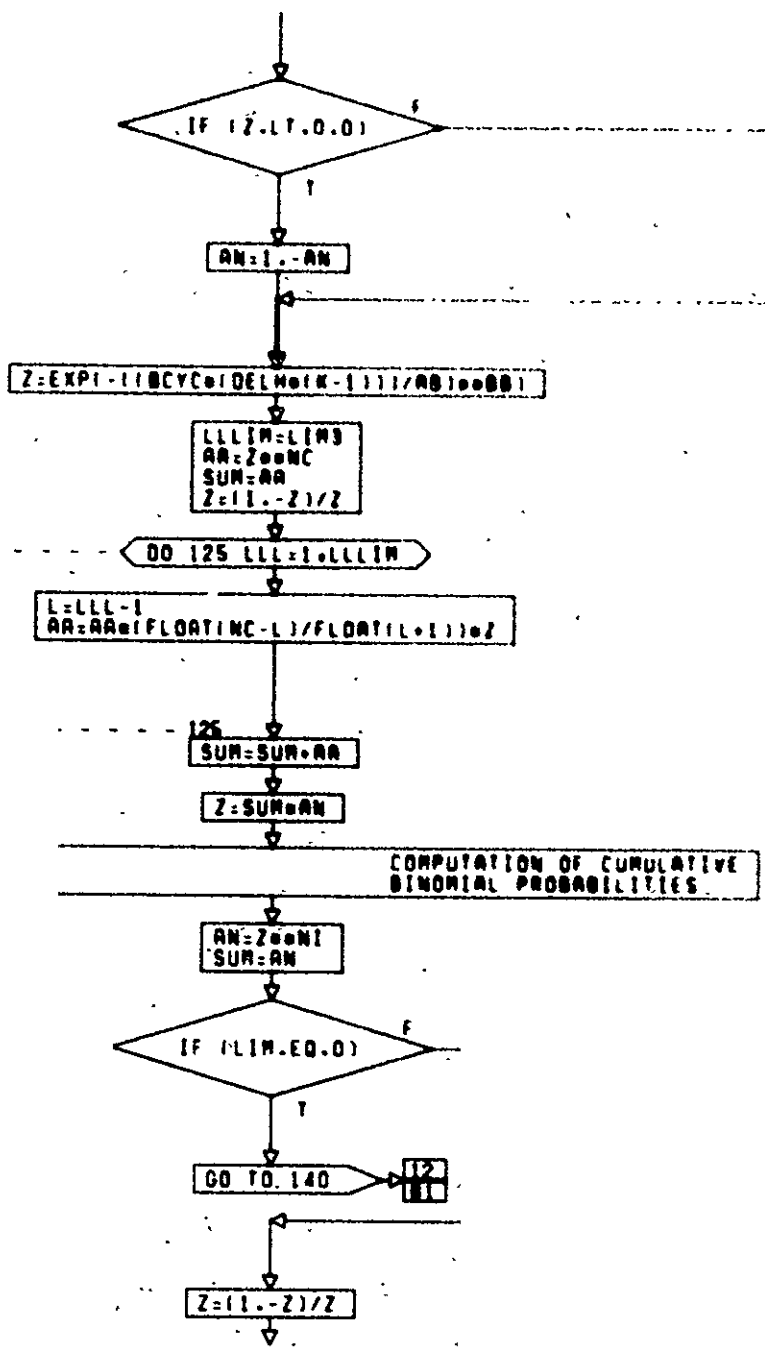
{F, ABS(Z).GT.4.0}

AN=1.-AN

AN=0.5\*(1.-AN)

CONT. ON PG 11

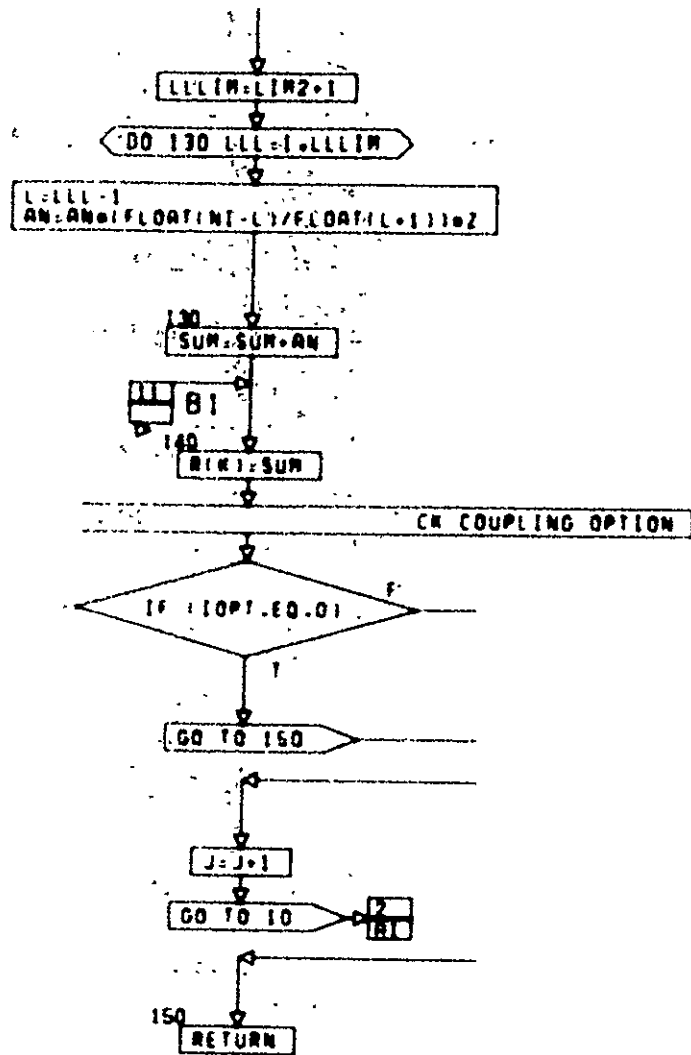
PG 100F 14



CONT. ON PG 12

PG 1 OF 14

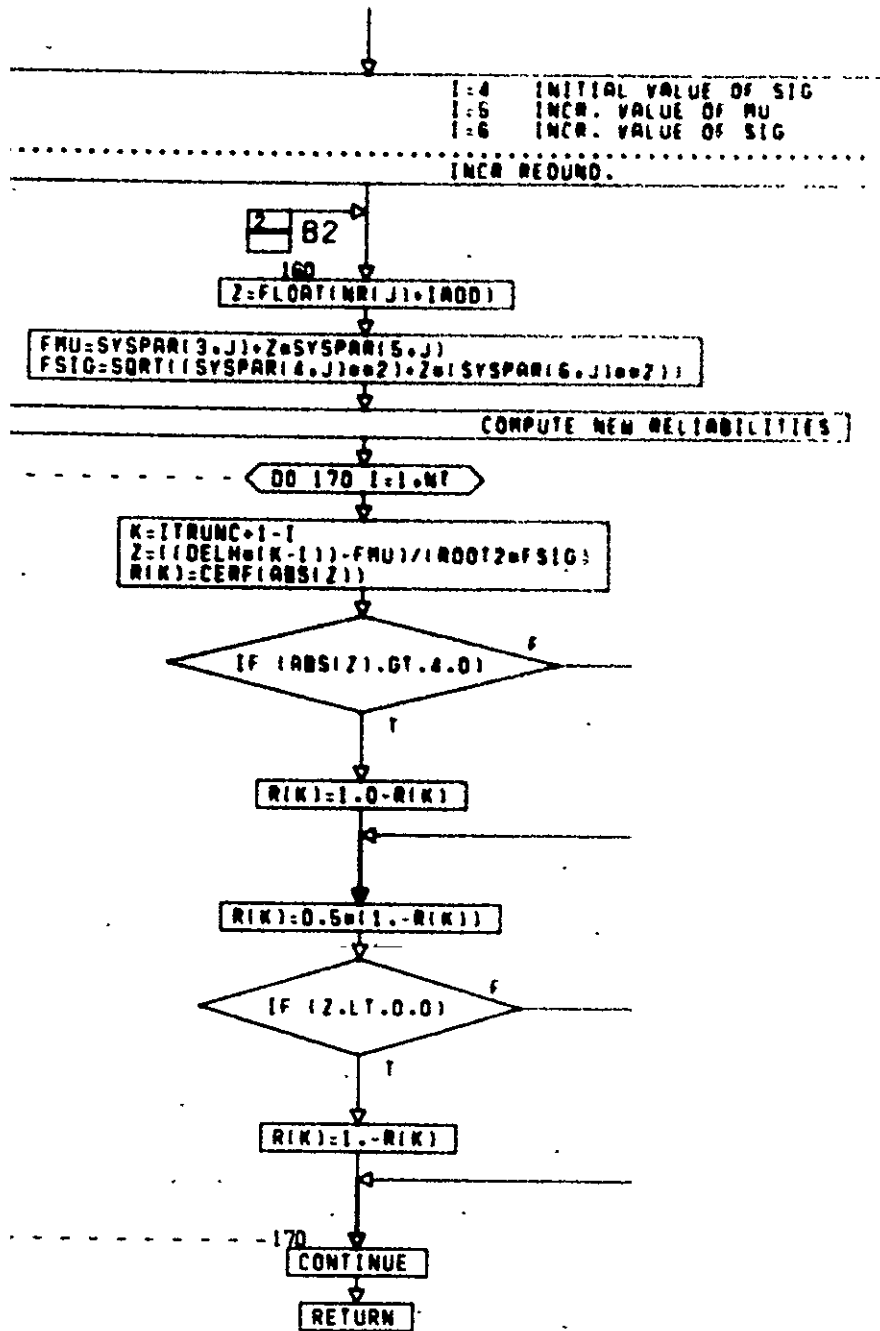




MODEL 4				
VARIABLES	SIZE	ORIGIN	DEFN	
F MU	SC	LOCAL	MEAN EXPENABLE DEPLETION TIME	
F SIG	SC	LOCAL	STD. DEV. OF DEPLETION TIME	
S YSPAR	I, J	GLOBAL	MODEL PARAMETERS FOR J-TH MODULE	
			I=3 INITIAL VALUE OF MU	

CONT. ON PG 13

PG 12E 14



CONT. ON PG 14

PG 1 OF 1

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OF POOR QUALITY

END

PG 14 FINAL

10-356

SUBROUTINE QSF(H,Y,Z,NOIM)

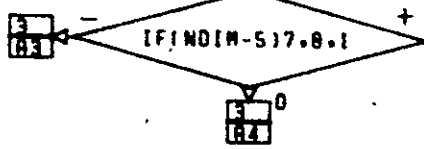
.....  
SUBROUTINE QSF  
PURPOSE  
TO COMPUTE THE VECTOR OF INTEGRAL VALUES FOR A GIVEN  
EQUIDISTANT TABLE OF FUNCTION VALUES.  
USAGE  
CALL QSF (H,Y,Z,NOIM)  
DESCRIPTION OF PARAMETERS

H - THE INCREMENT OF ARGUMENT VALUES.  
Y - THE INPUT VECTOR OF FUNCTION VALUES.  
Z - THE RESULTING VECTOR OF INTEGRAL VALUES. Z MAY BE  
IDENTICAL WITH Y.  
NOIM - THE DIMENSION OF VECTORS Y AND Z.  
REMARKS  
NO ACTION IN CASE NOIM LESS THAN 3.  
SUBROUTINES AND FUNCTION SUBPROGRAMS REQUIRED

NONE  
METHOD  
BEGINNING WITH Z(1)=0, EVALUATION OF VECTOR Z IS DONE BY  
MEANS OF STIMPSONS RULE TOGETHER WITH NEWTONS 3/8 RULE OR A  
COMBINATION OF THESE TWO RULES. TRUNCATION ERROR IS OF  
ORDER H\*\*5 (I.E. FOURTH ORDER METHOD). ONLY IN CASE NOIM=3  
TRUNCATION ERROR OF Z(2) IS OF ORDER H\*\*4.  
FOR REFERENCE, SEE :

- 1) F.B.HILDEBRAND, INTRODUCTION TO NUMERICAL ANALYSIS,  
MCGRAW-HILL, NEW YORK/TORONTO/LONDON, 1968, PP.71-76.
- 2) R.ZURMUEHL, PRAKTISCHE MATHEMATIK FUER INGENIEURE UND  
PHYSIKER, SPRINGER, BERLIN/GOETTINGEN/HEIDELBERG, 1963,  
PP.214-221.

DIMENSION Y(1),Z(1)  
HT=.3333333#H



NOIM IS GREATER THAN 5. PREPARATIONS OF INTEGRATION LOOP

SUM1=Y(2)+Y(2)

SUM1=SUM1+SUM1

CONT. ON PG 2

```

SUM1=HT(Y(1))+SUM1-Y(3))
AUX1=Y(4)+Y(4)
AUX1=AUX1+AUX1
AUX1=SUM1+HT(Y(3)+AUX1+Y(5))
AUX2=HT(Y(1))+3.075(Y(2)+Y(5))+2.625(Y(3)+Y(4))+Y(6))
SUM2=Y(6)+Y(5)
SUM2=SUM2+SUM2

```

```

SUM2=AUX2+HT(Y(4)+SUM2+Y(6))
Z(1)=0.
AUX=Y(3)+Y(3)
AUX=AUX+AUX
Z(2)=SUM2+HT(Y(2)+AUX+Y(4))
Z(3)=SUM1
Z(4)=SUM2

```

```

IF (NDIM 6) 5.5.2

```

```

0

```

```

C INTEGRATION LOOP

```

```

DO 4 I=7,NDIM,2

```

```

SUM1=AUX1
SUM2=AUX2
AUX1=Y(I-1)+Y(I-1)
AUX1=AUX1+AUX1
AUX1=SUM1+HT(Y(I-2)+AUX1+Y(I))
Z(I-2)=SUM1

```

```

IF (I-NDIM) 3.6.6

```

```

0

```

```

3
AUX2=Y(I)+Y(I)

```

```

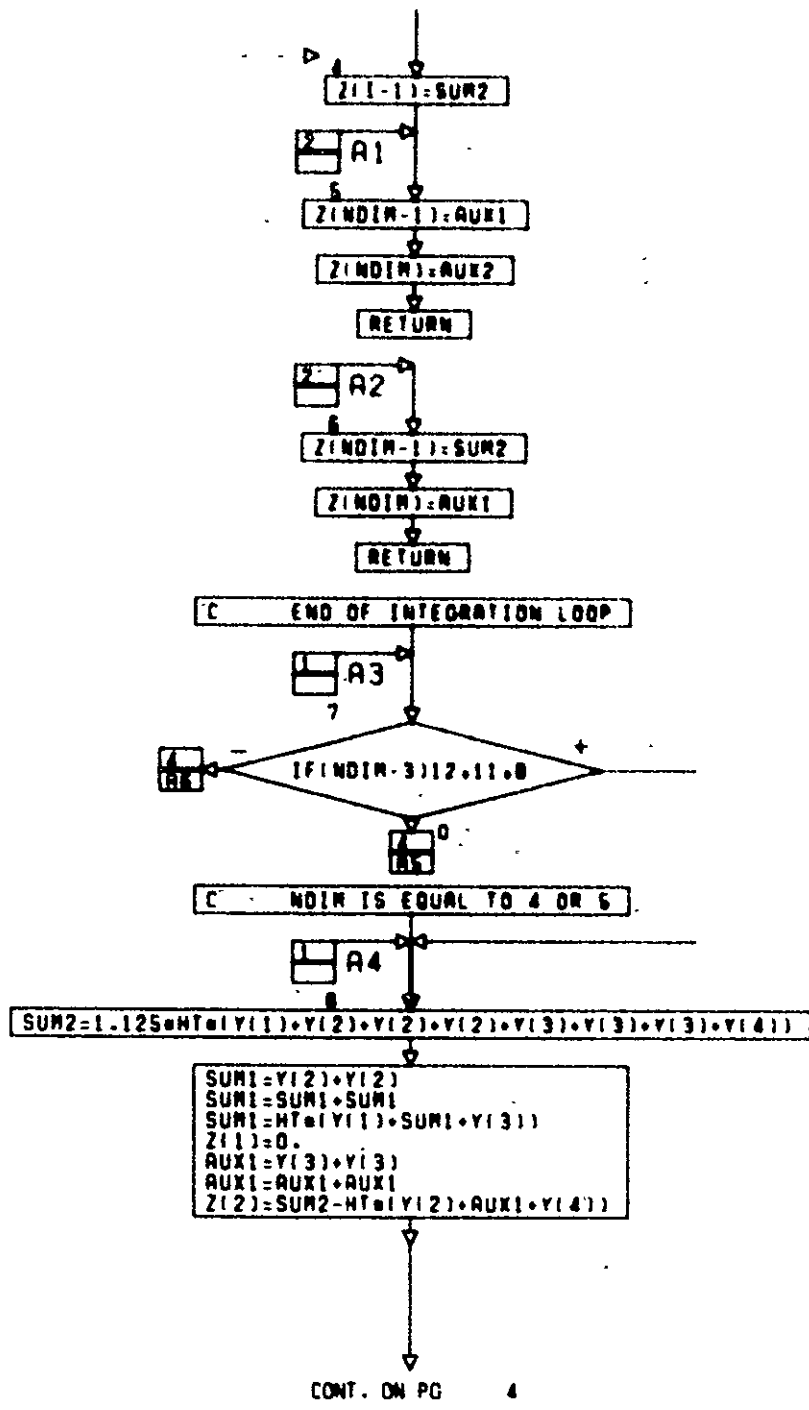
AUX2=AUX2+AUX2
AUX2=SUM2+HT(Y(I-1)+AUX2+Y(I+1))

```

```

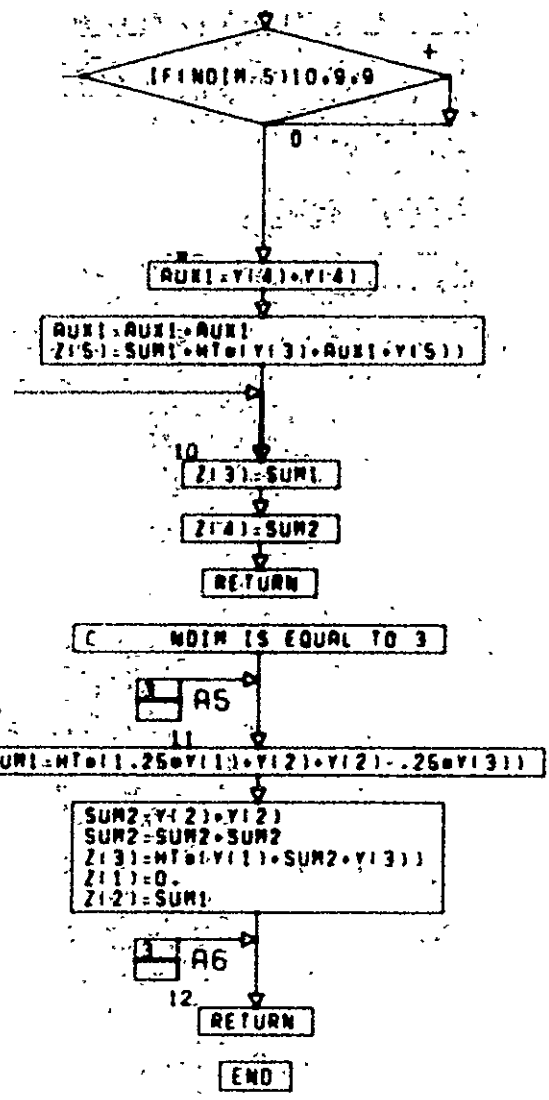
CONT. ON PG 3

```



CONT. ON PG 4

ORIGINAL PAGE IS  
NOT FOR REPRODUCTION



```

SUBROUTINE DPI (IPIC,IERR,ITER,NCONF,ICHOSE,NCHOSE,NOMAT)
DIMENSION IPIC(2), ICHOSE(2), NCONF(6), NCHOSE(2)
COMMON /USER3/BTRNK,SCSFL,TPRFL,OPSMS,ARRAYN(1,3),MSE0

```

```

COMMON /BTM/MT,VOL,DT,D,DX,DY,DZ,XJ,YJ,ZJ,RJ,FF,FI,PL,PLAIN,
LMBDD,AREA,SATLO,RATE,NC,ACSM,WARMT,THCMT,CONVM,TKMT,PASST,
SATMT,TPRN,IBT, ,RADA,RADAB,RAT,HTPRM,HTPRB,
HPT,HTPIPE,VCHP,H T,FC,XNZERO,COMRT,ACSSN,BITRAT(2),
EOBLG,SABLO,SATM

```

```

COMMON /DBCOM/IDB(30),DATA(65,90)

```

```

COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),REL(5,60),
THM(4,60),ARRAY(1,60),SKD(7,60)

```

```

COMMON /OPTAB/HSRT(60),TLPTH(60),GRANH(60),XSRT(60),TLPTL(60),GR
ANL(60)

```

```

COMMON /PRTCON/ACCRCY,CISTAR,IREL,ANDOLD,TRUNC,ITRUMP,OE,TE,
TOOLR,QCR,SEIR,PMR,PE,PU,TOOLU,QCP,SEIP,PMF,SATA,SATINV,NER,
MEINV,PAYR,PAUINV,PAYOUL,GSE,XLTOT,CTOT,FEER,FEEINV,ODIE,XVEST,
OPS,SKTAU(6),ROLD(60),TSRT,AN,TS,DS,AN,TF,BF,FC,TA,TD,TOTOPS

```

```

DATA ACSRT,ACSOP,COMOP,OPREQ/10.,50.,6.,4./

```

```

C INPUT INPUTS FOR DATA PROCESSING SUBSYSTEMS - DPI
C VAR. IN. T D SOURCE UNITS DESCRIPTION
C GRANH 36 R Y ALL S/S GRANULARITY HIGH RATE TABLE
C HSRT 35 R Y ALL S/S SPS SAMPLE RATE HIGH TABLE
C TLPTH 34-35 R Y ALL S/S NO OF ANDL AND DIG POINTS HIGH
C GRANL 40 R Y ALL S/S GRANULARITY LOW RATE TABLE
C XSRT 39 R Y ALL S/S SPS SAMPLE RATE LOW TABLE

```

```

C TLPTL 37-38 R Y ALL S/S NO OF ANDL AND DIG POINTS LOW
C SCSFL R U SPECIAL COMMAND SYNC FLAG
C TOTCM 30T032 R DB TOTAL NO OF COMMANDS
C COMTY R MACRO NCONF(3) - SPEC OR GEN COMPUTER FLAG
C TTCPL 32 R TIME TAG COMMAND FLAG
C TPRFL R U TELEM PROCESS FLAG
C ACSSN R SC SUM OF ACS SENSOR
C COMRT R COMM COMMAND RATE

```

```

C OPSMS R U SEC-1 MISSION OPS
C MISPD I U MISSION DATA PROC. FLAG
C ERROR FLAGS
C IERR = 1 MUX IS REQUIRED
C IERR = 10 WORD LENGTH GREATER THAN 256
C IERR = 100 BIT RATE IS TOO LARGE
C IERR = 1000 SPECIAL COMMAND SYNC FLAG IS NOT EQUAL TO ZERO
C IERR = 10000 JI .GE. JIE

```

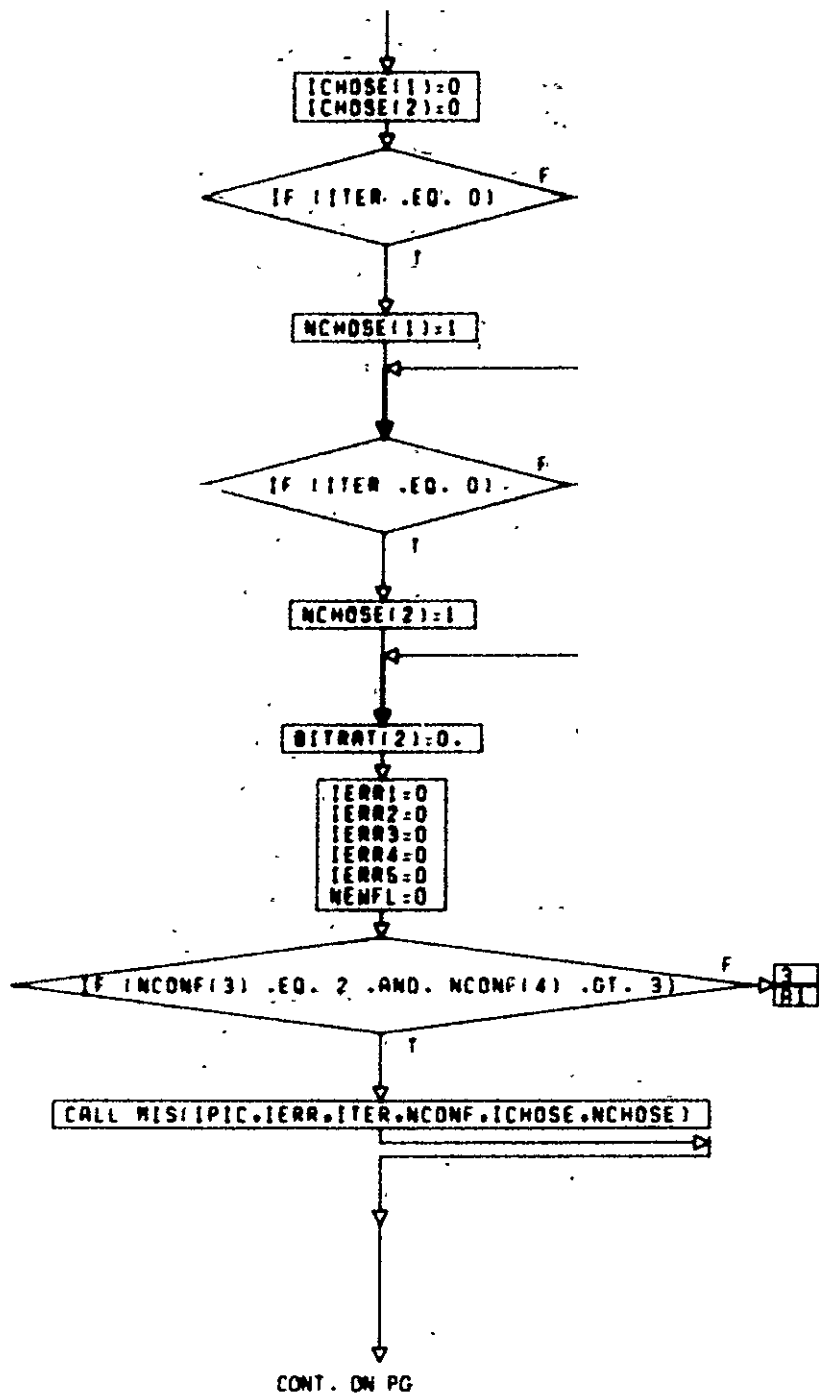
```

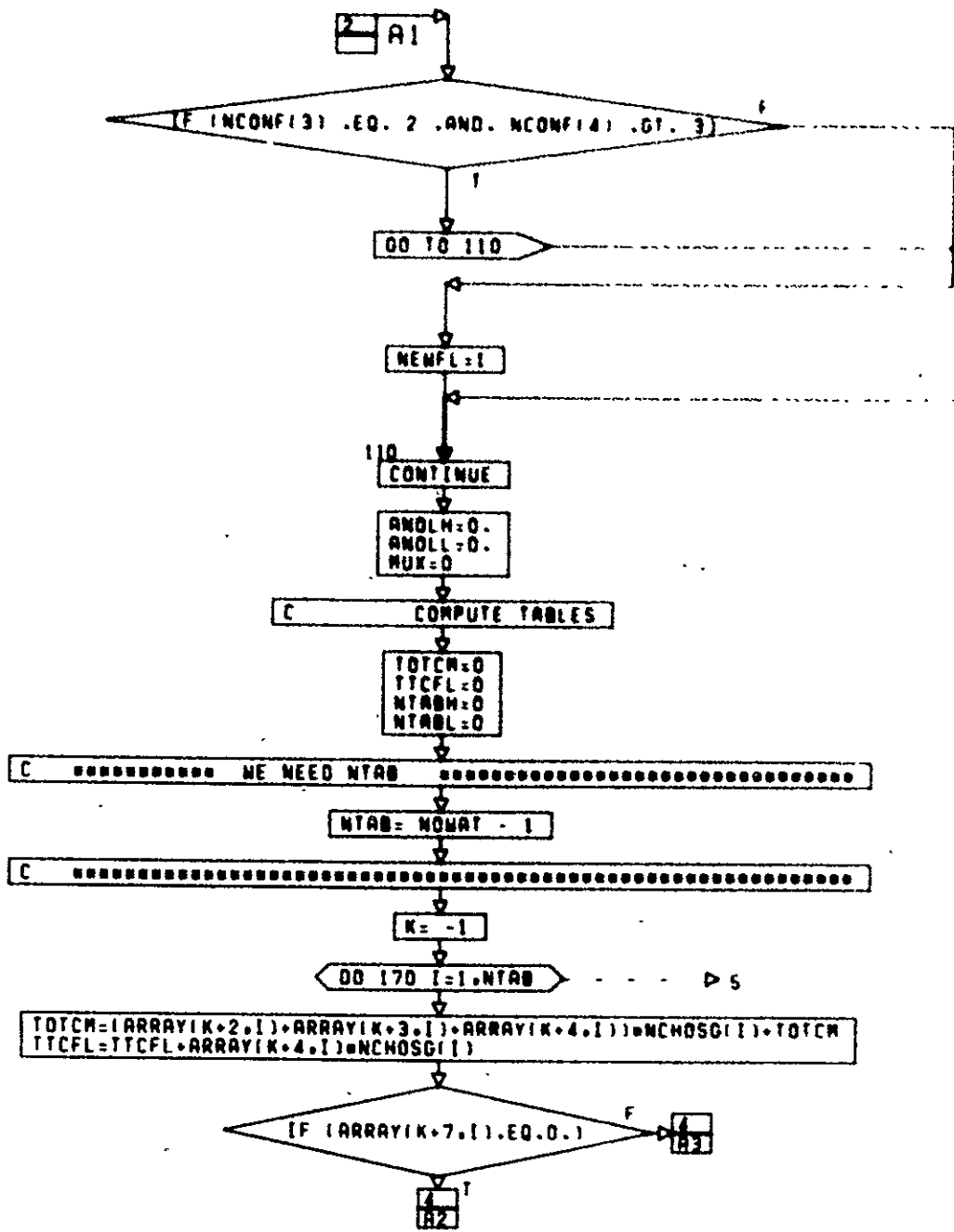
IERR=0

```

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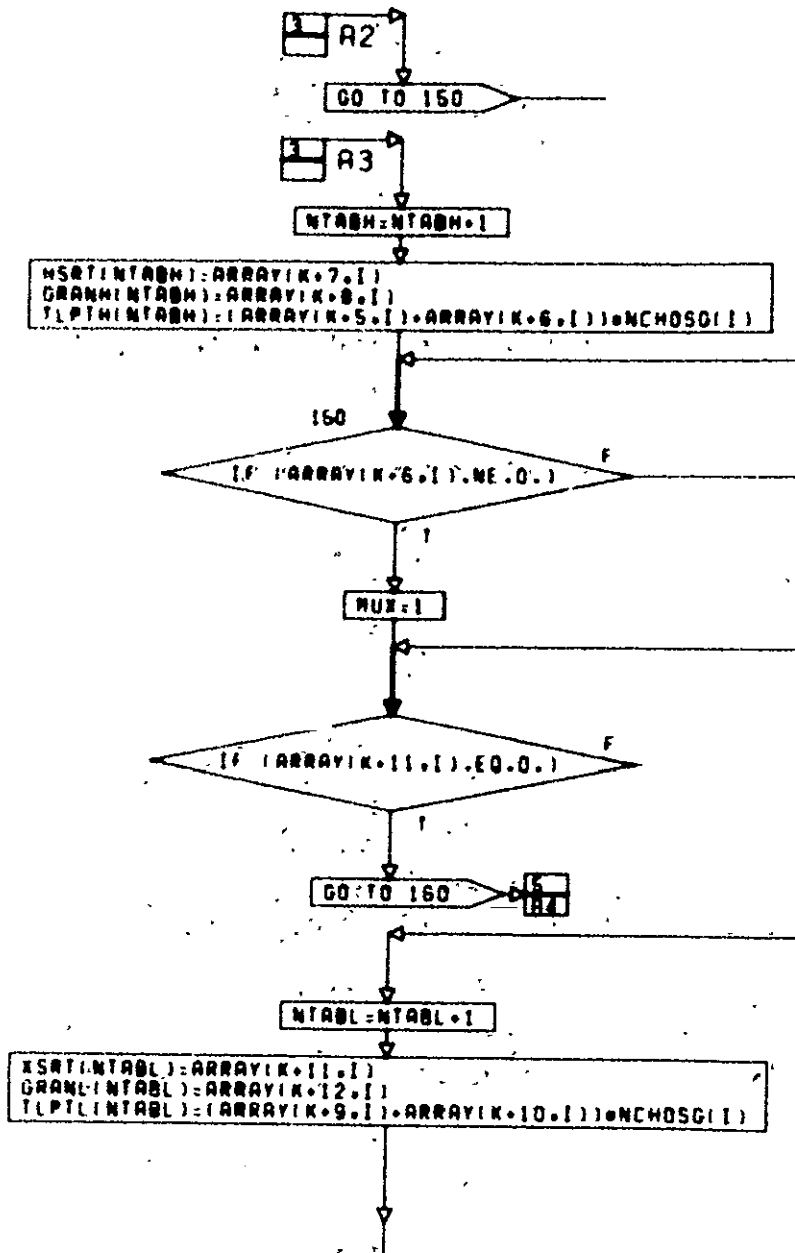






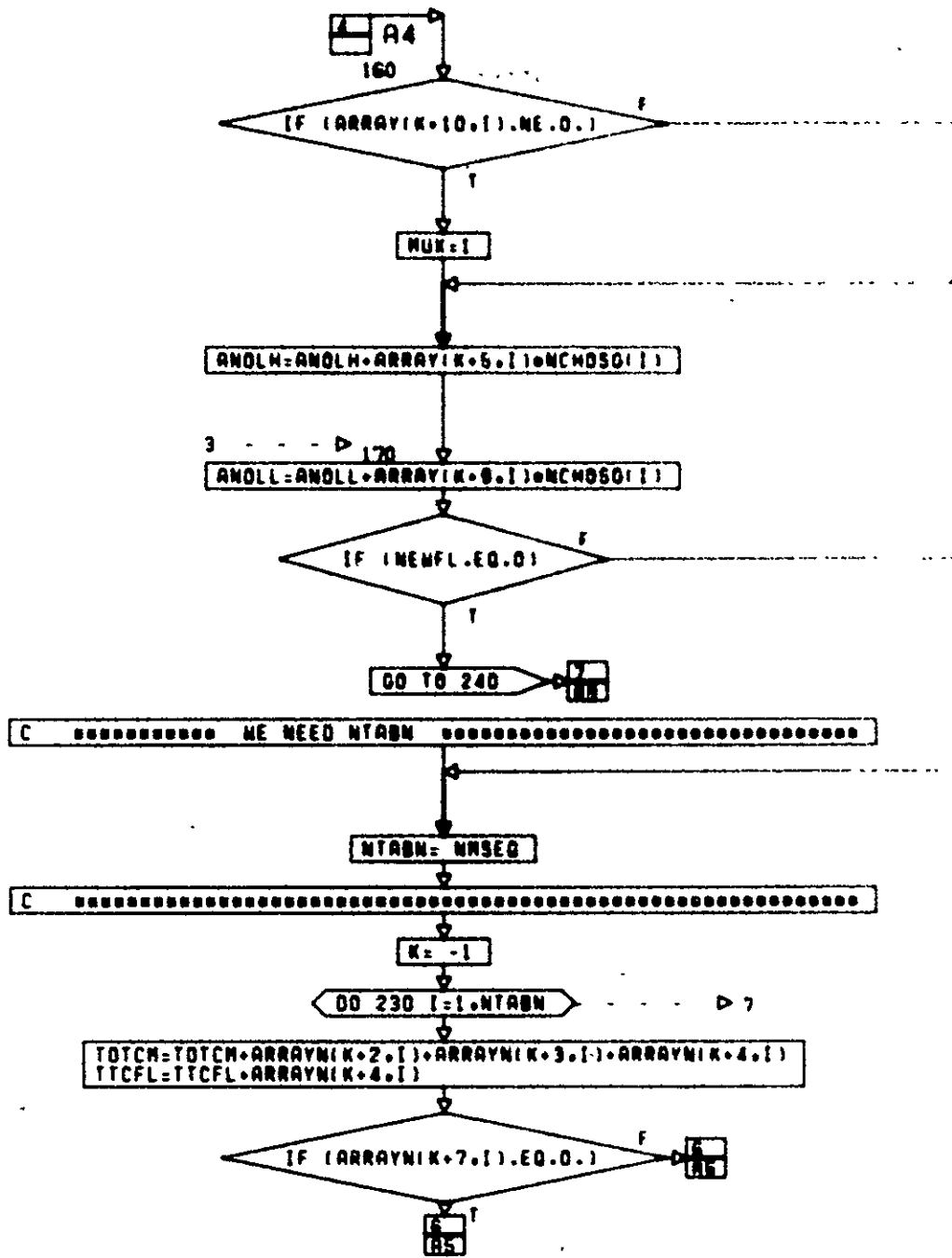
CONT. ON PG 4

PG 3 OF 21



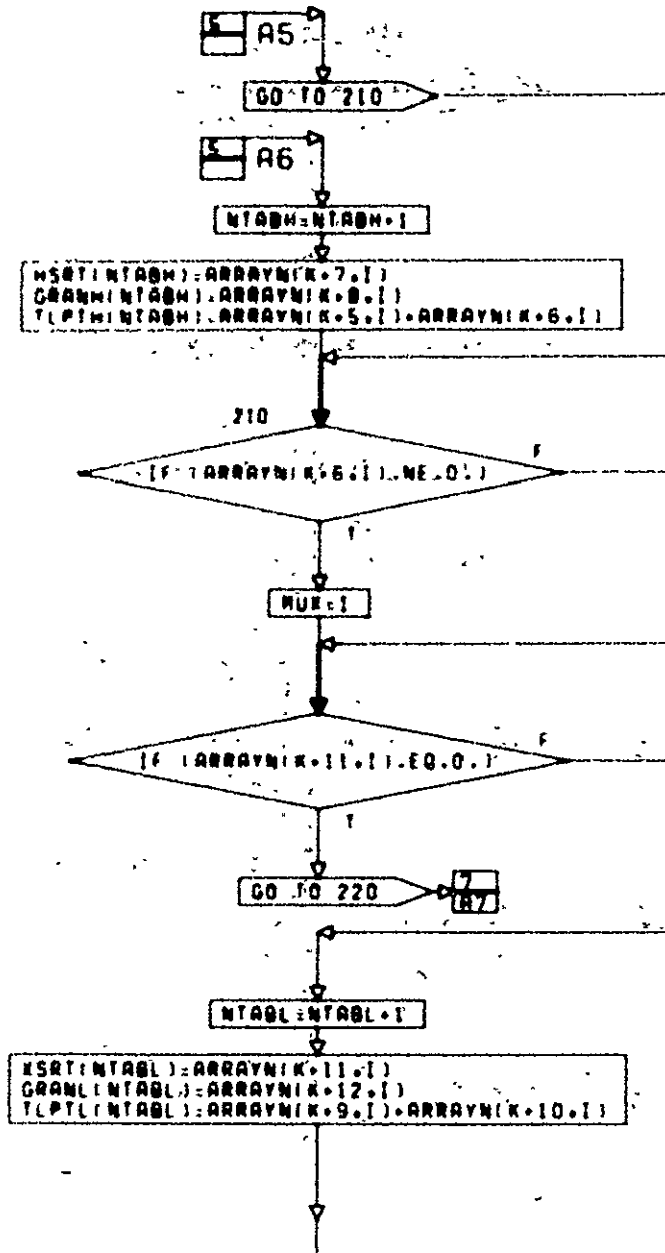
CONT. ON PG 5

PG 4 OF 21



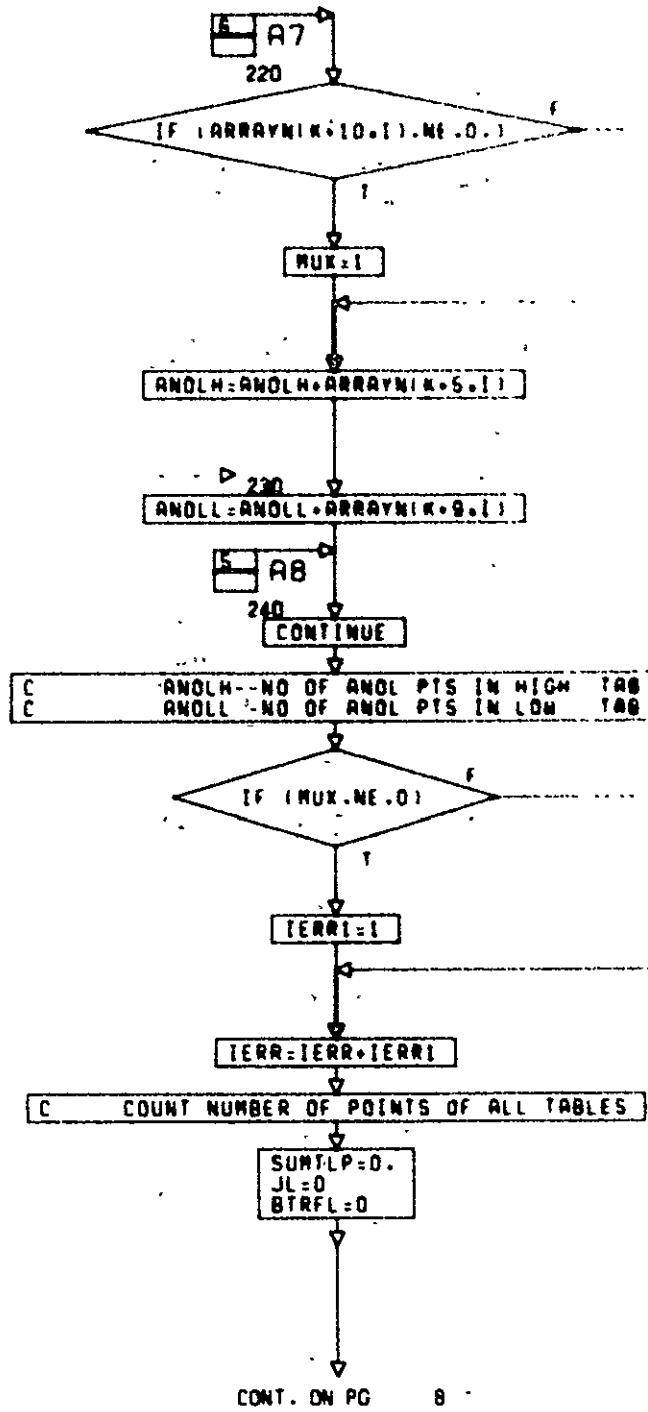
CONT. ON PG 6

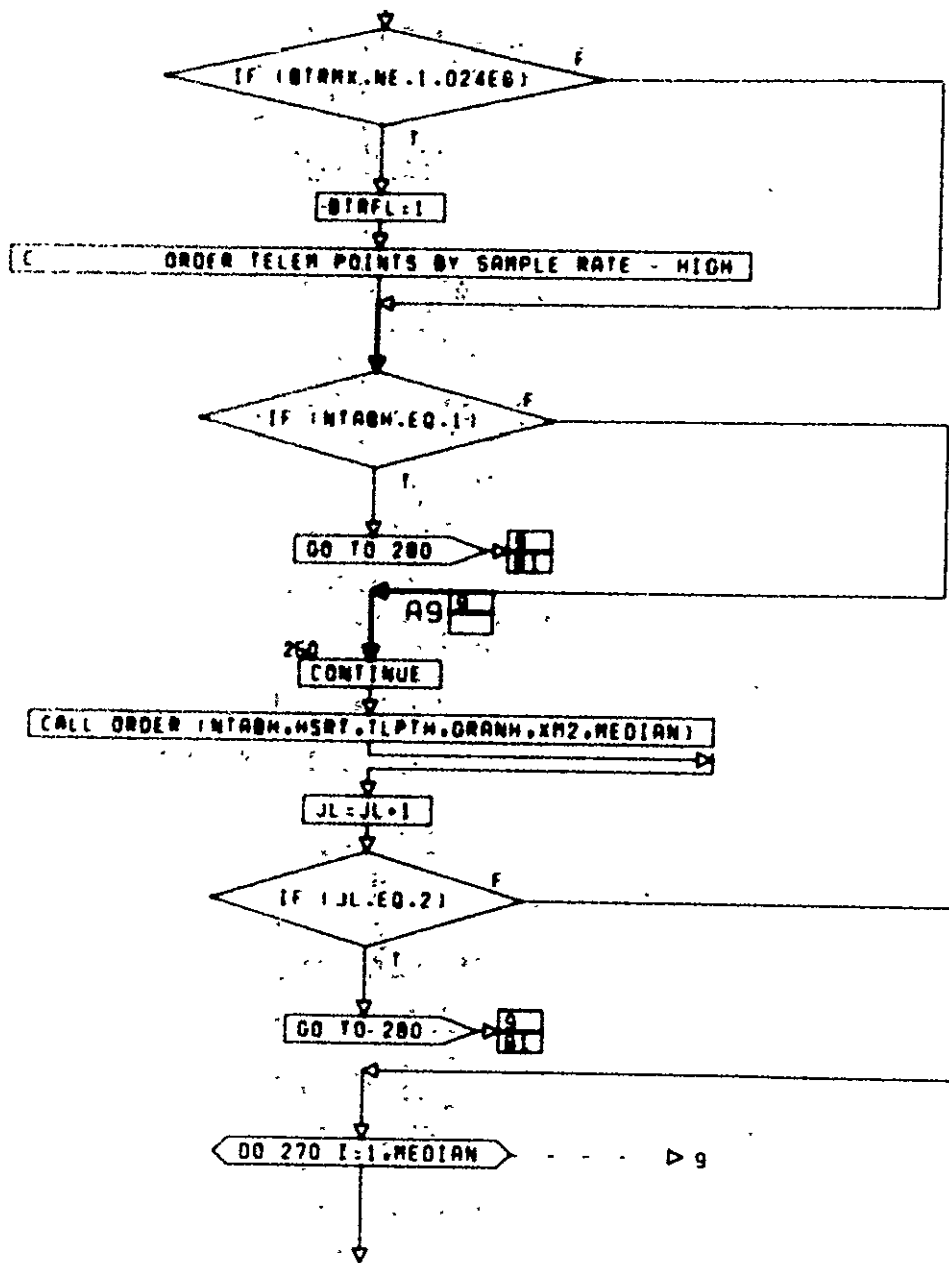
PG 5 OF 21



CONT. ON PG

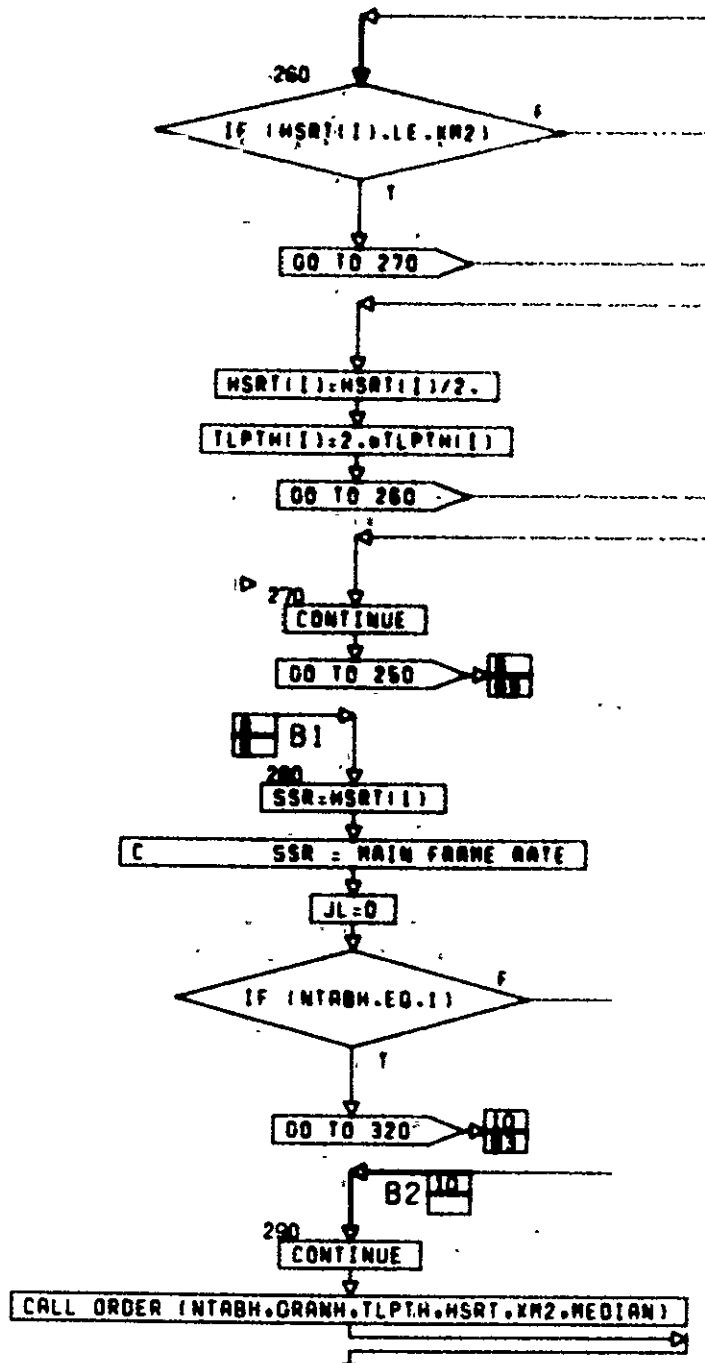
PG 6 OF \_\_\_\_\_





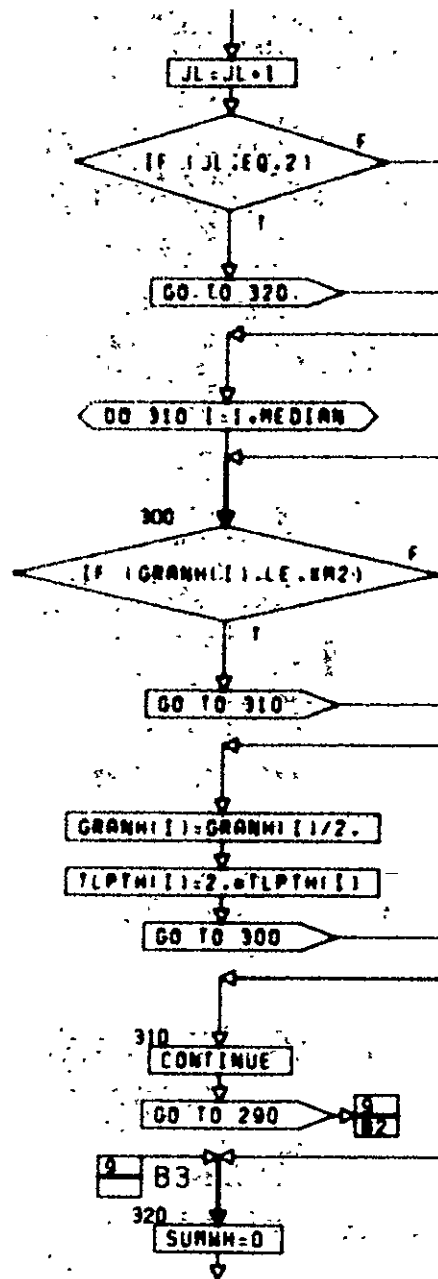
CONT. ON PG 9

PG 8 OF 21



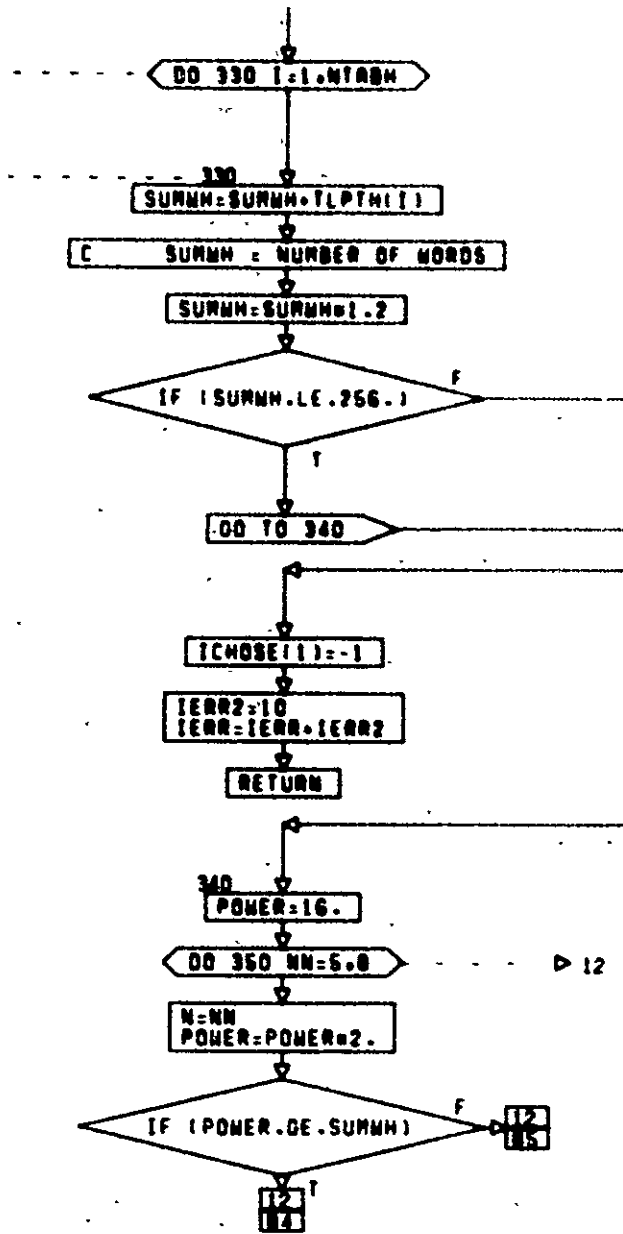
CONT. ON PG 10





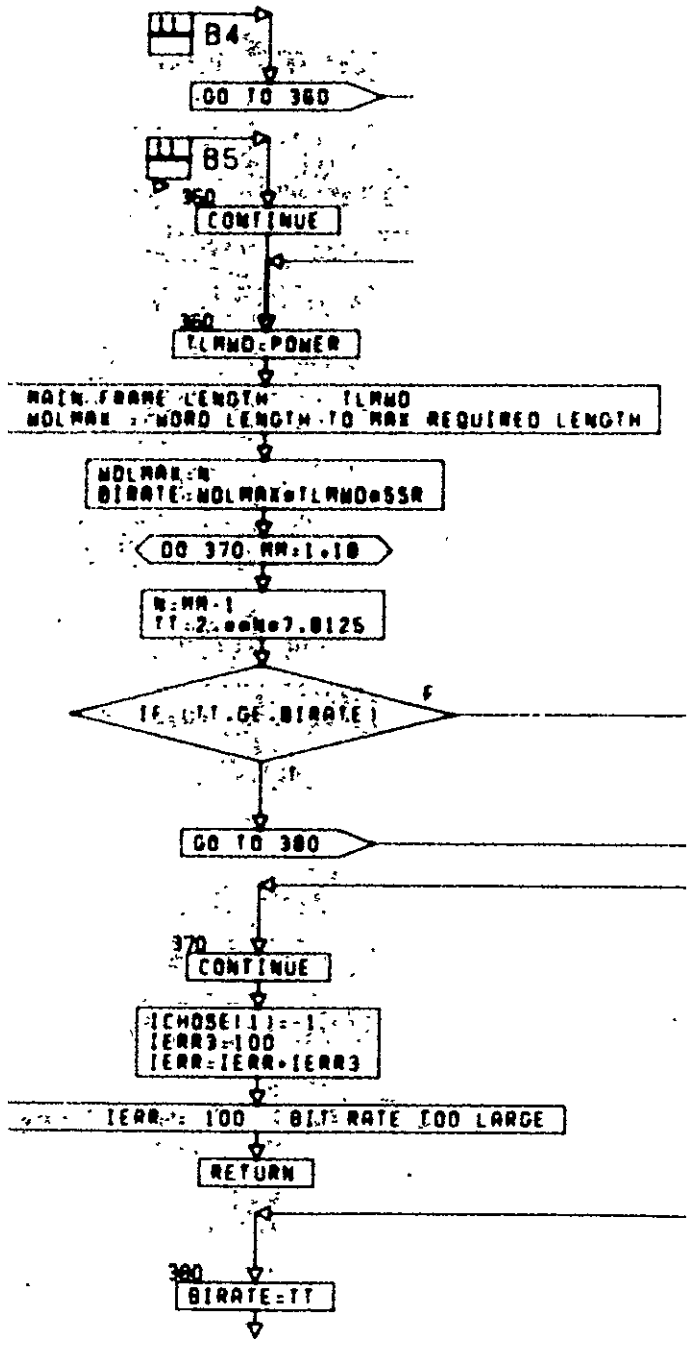
CONT. ON PG 11

PG 10 OF 21



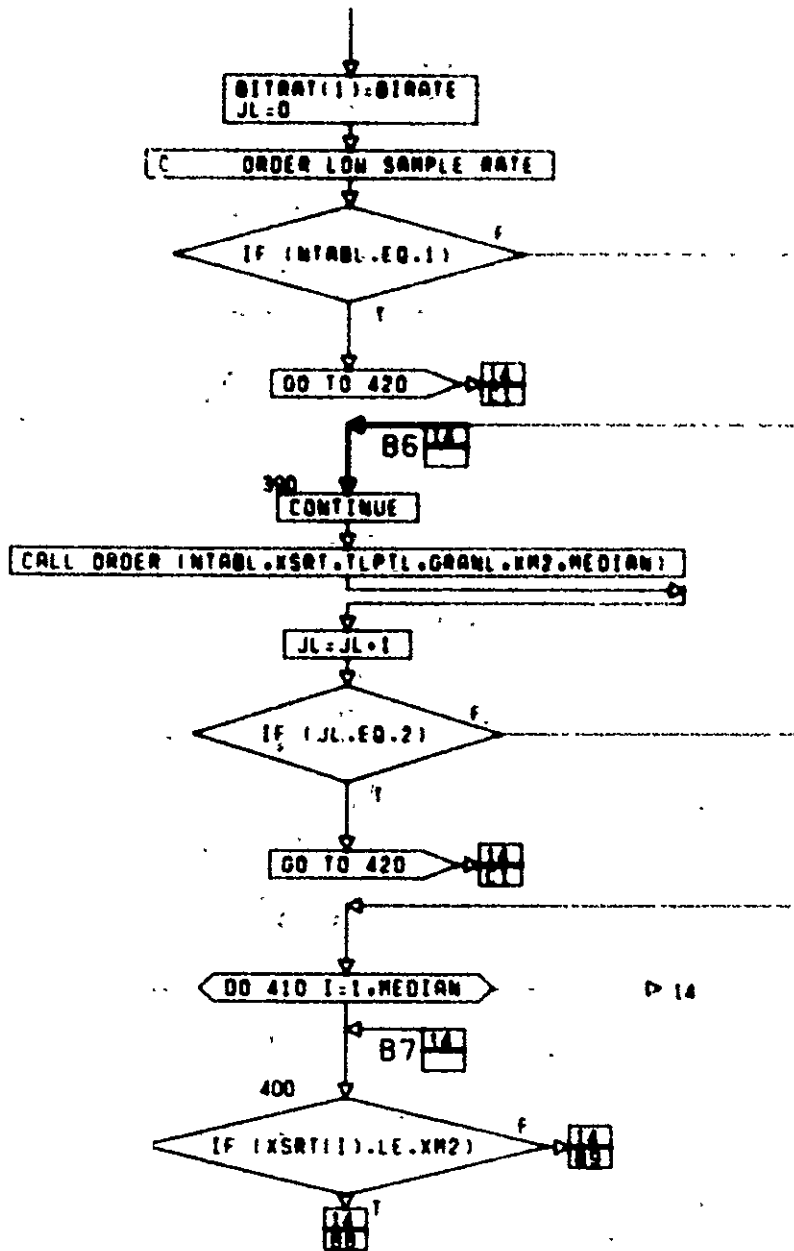
CONT. ON PG 12

PG 1 OF 21



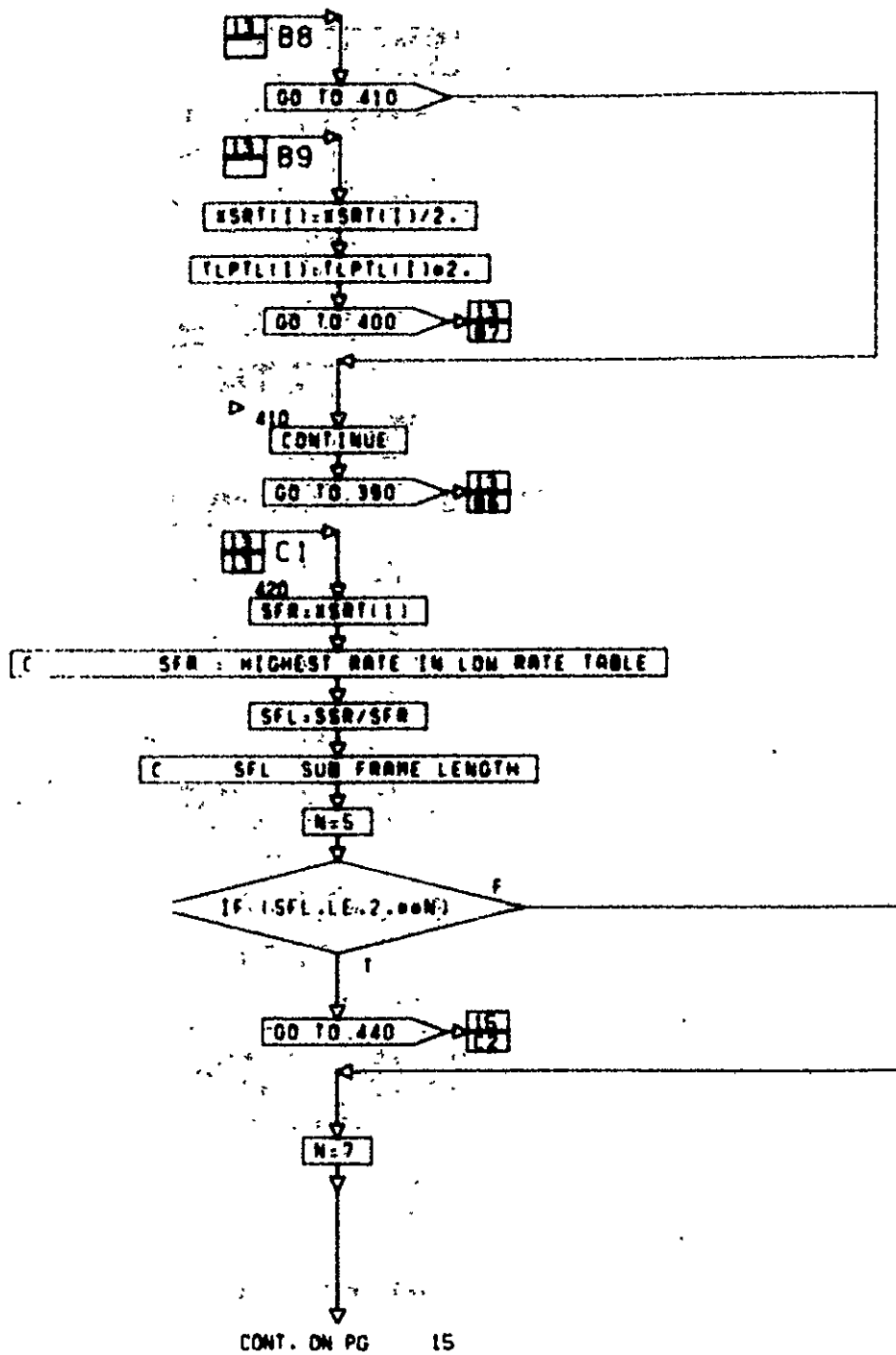
CONT. ON PG 13

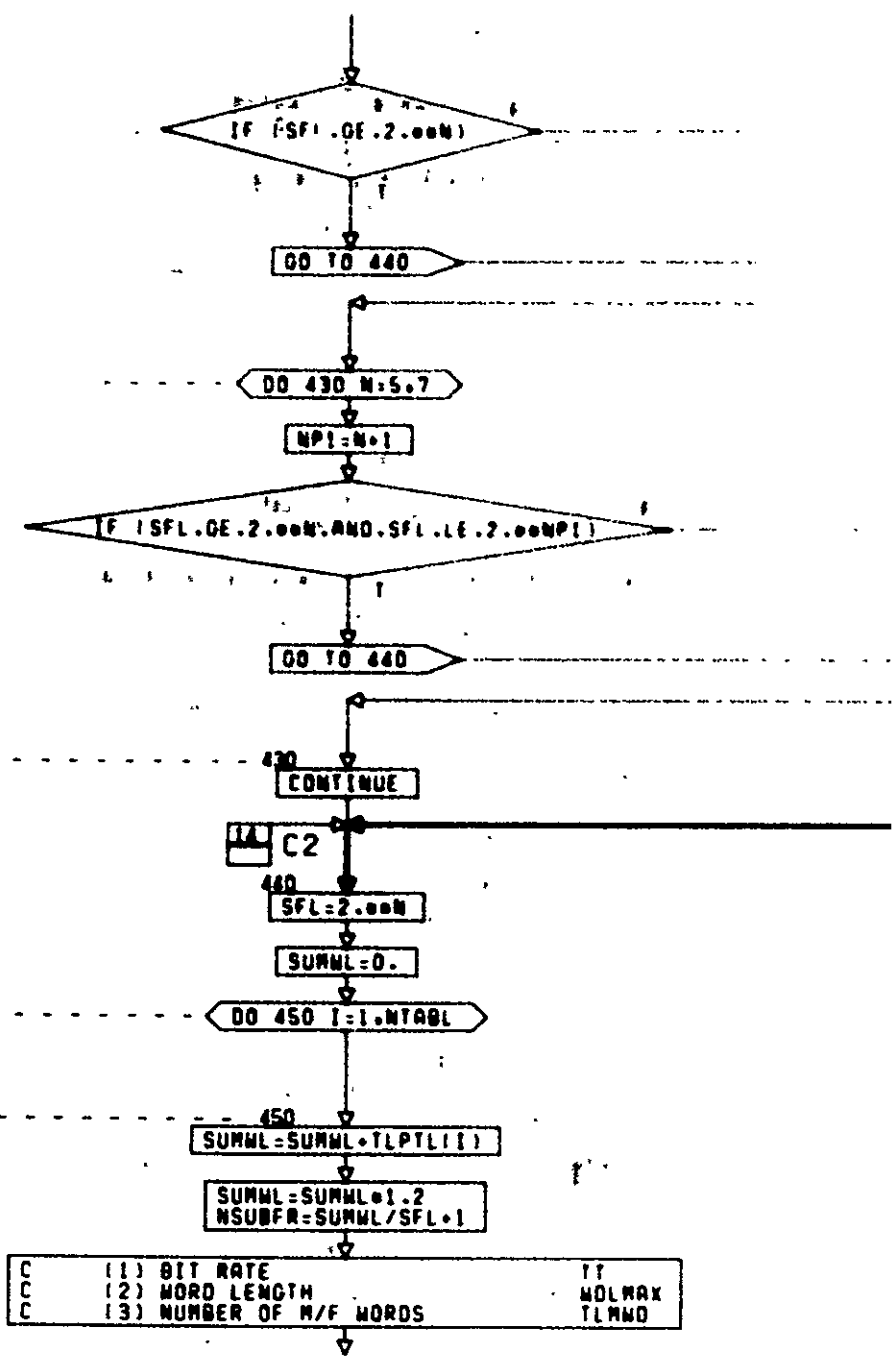
PG 12F 21



CONT. ON PG 14

PG. 13 OF 21



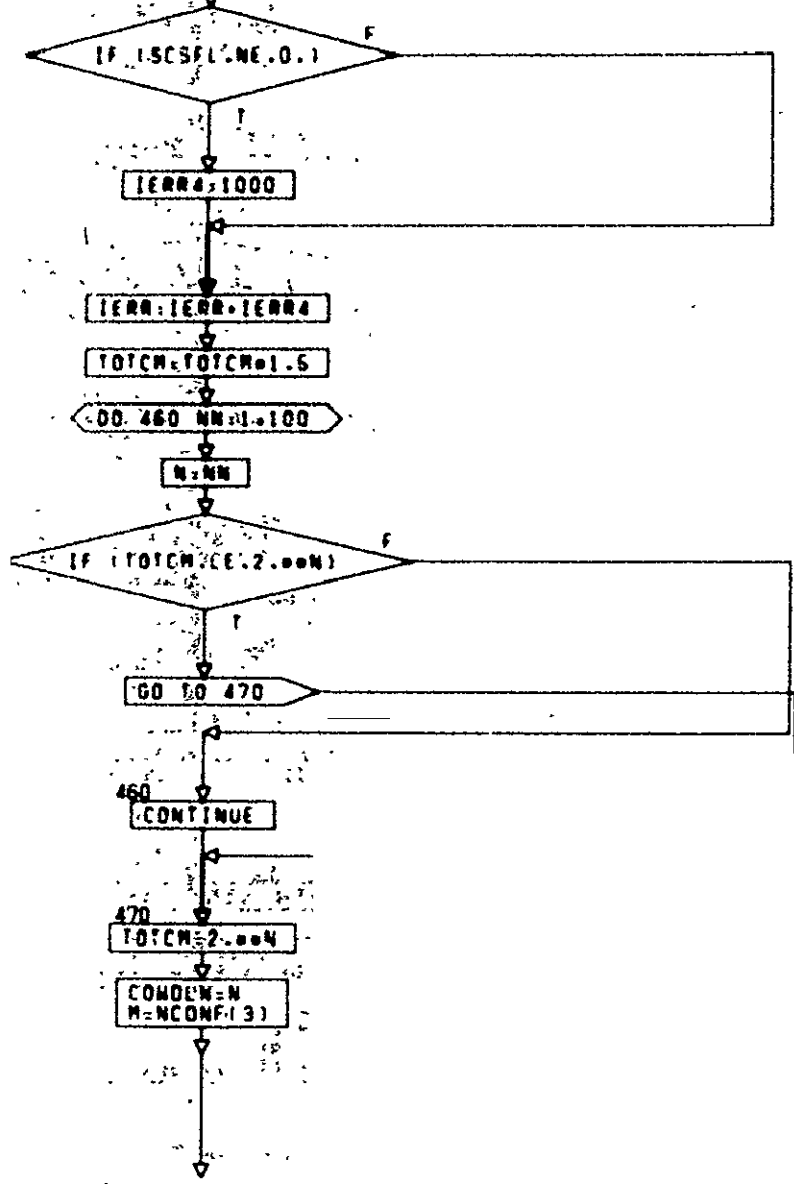


C	(1) BIT RATE	YF
C	(2) WORD LENGTH	MOLMAX
C	(3) NUMBER OF M/F WORDS	TLAWD

CONT. ON PG 16

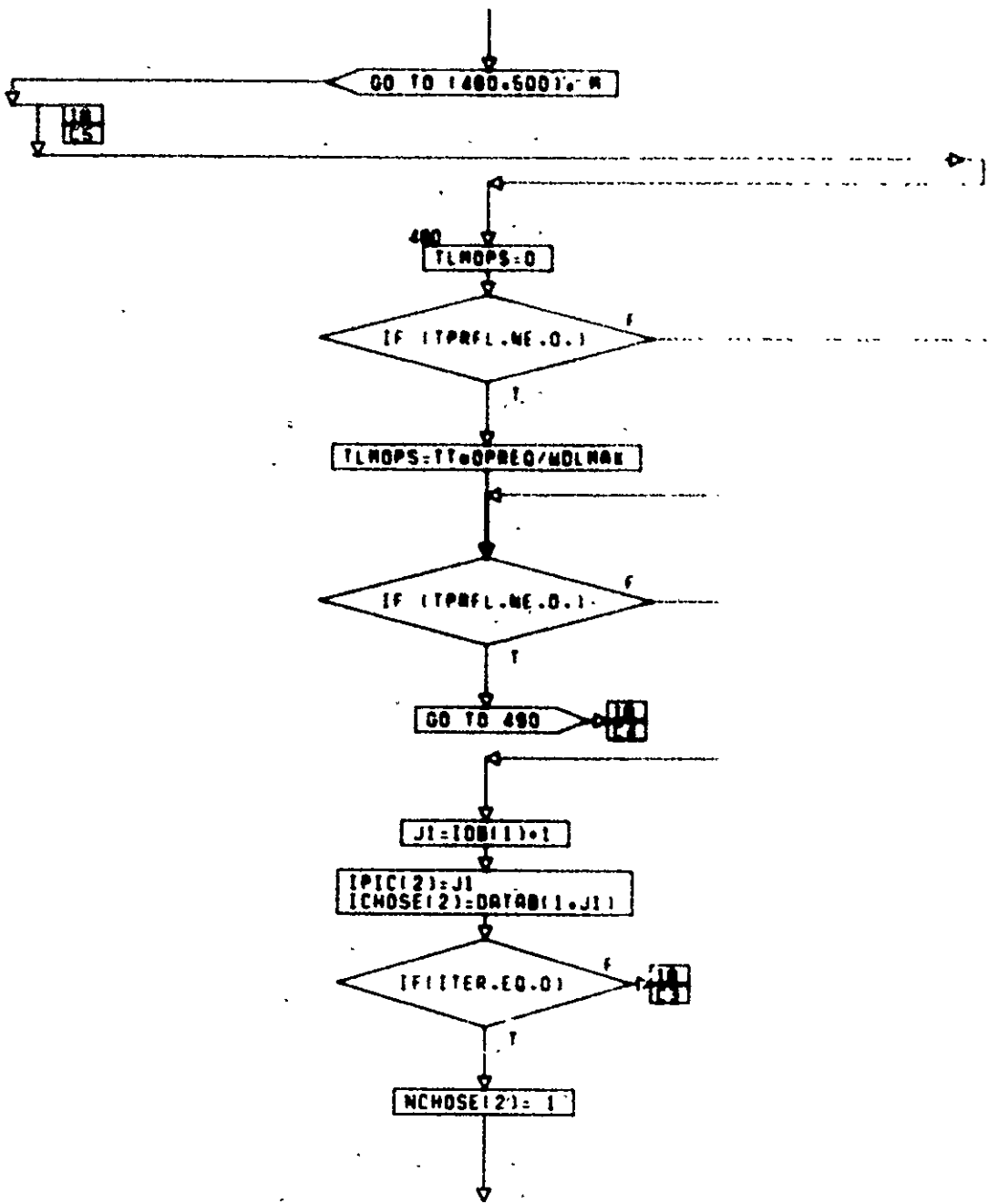
PG 15OF 21

C	14)	NUMBER OF SUBFRAMES	NSUBFR
C	15)	NUMBER OF WORDS PER S/F	SFL
C	16)	NEED FOR DIGITAL MUX	MUX
C		SPECIAL COMMAND SYNC FLAG	



CONT. ON PG 17

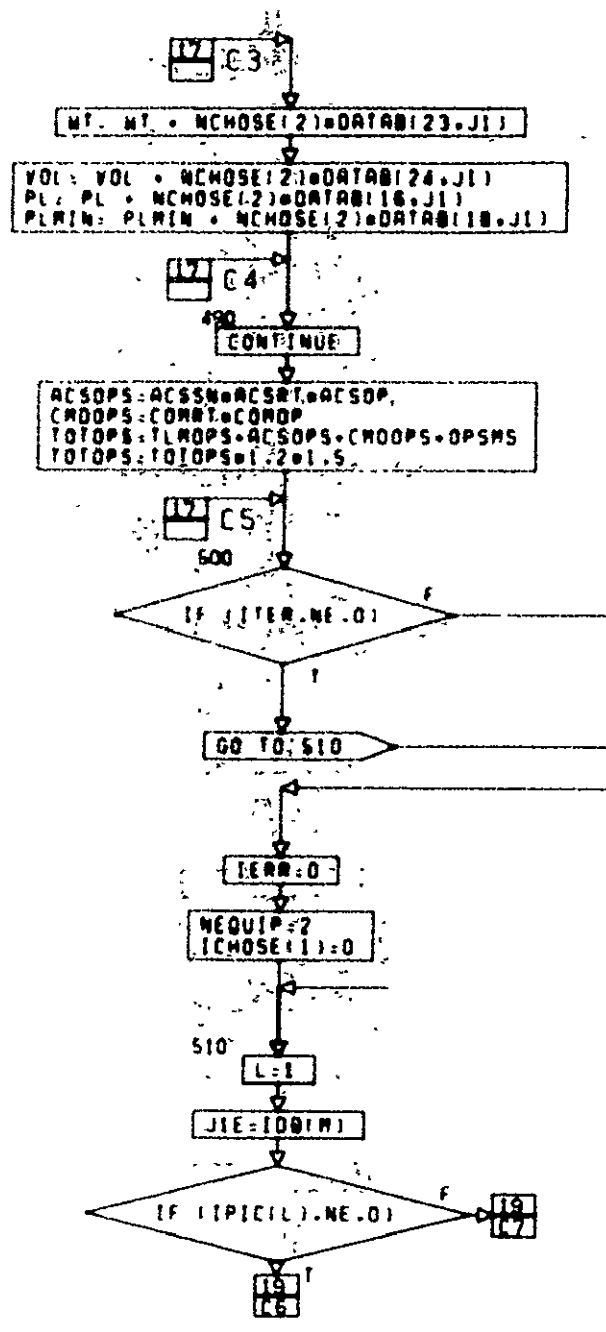
PG 100F 21



CONT. ON PG 18

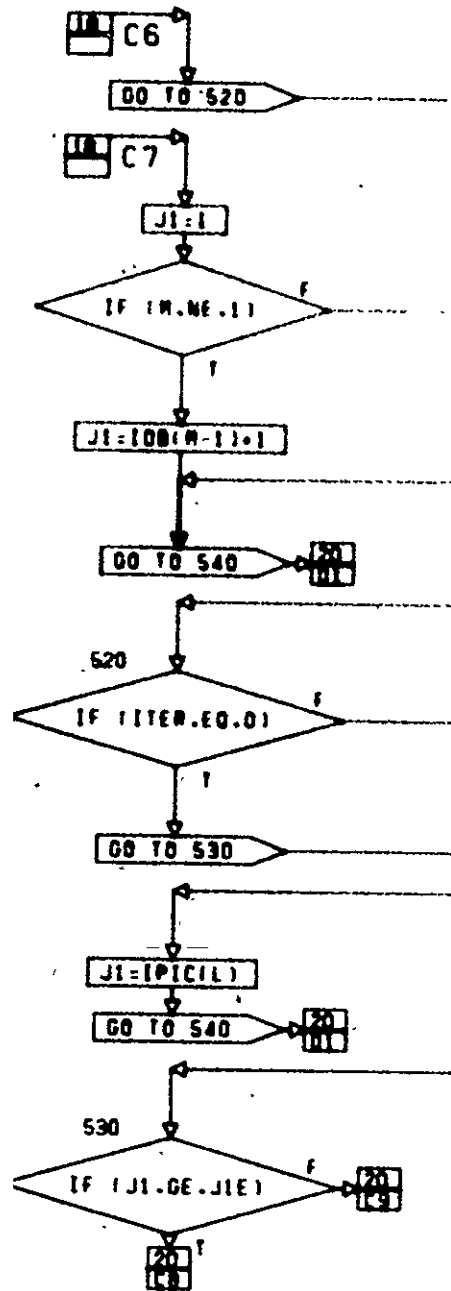
PG 17E 21





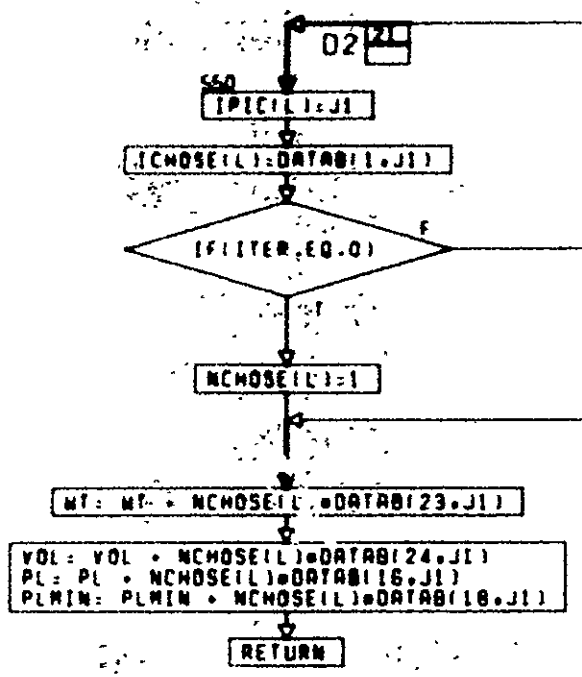
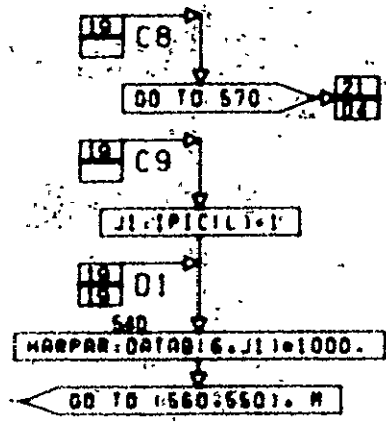
CONT. ON PG 19

PG 18 OF 21



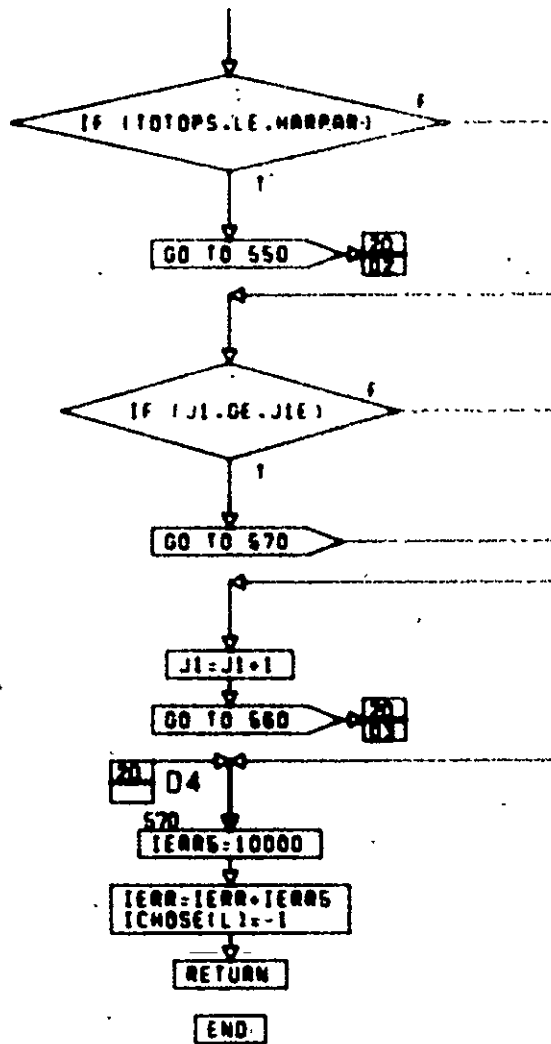
CONT. ON PG 20

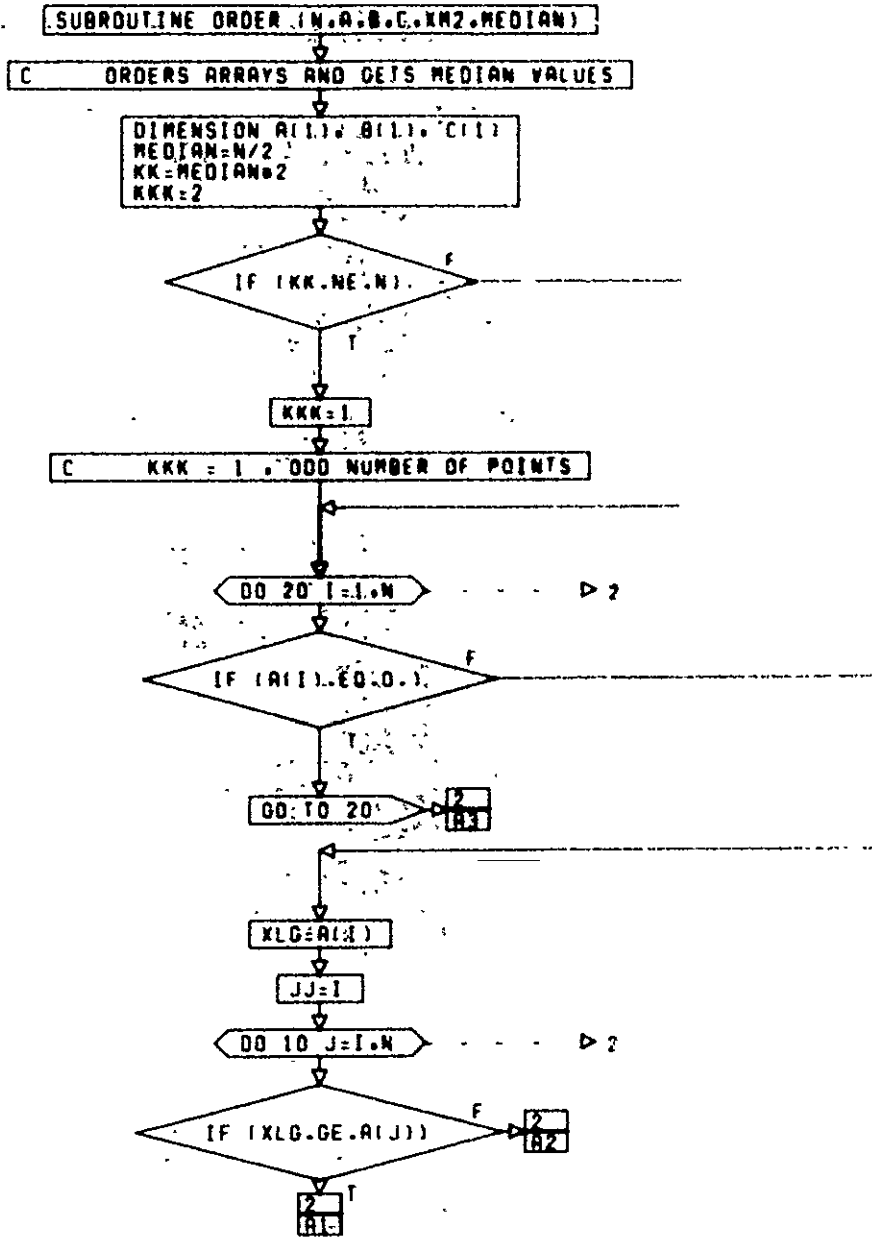
PG 19F 21



CONT. ON PG 21

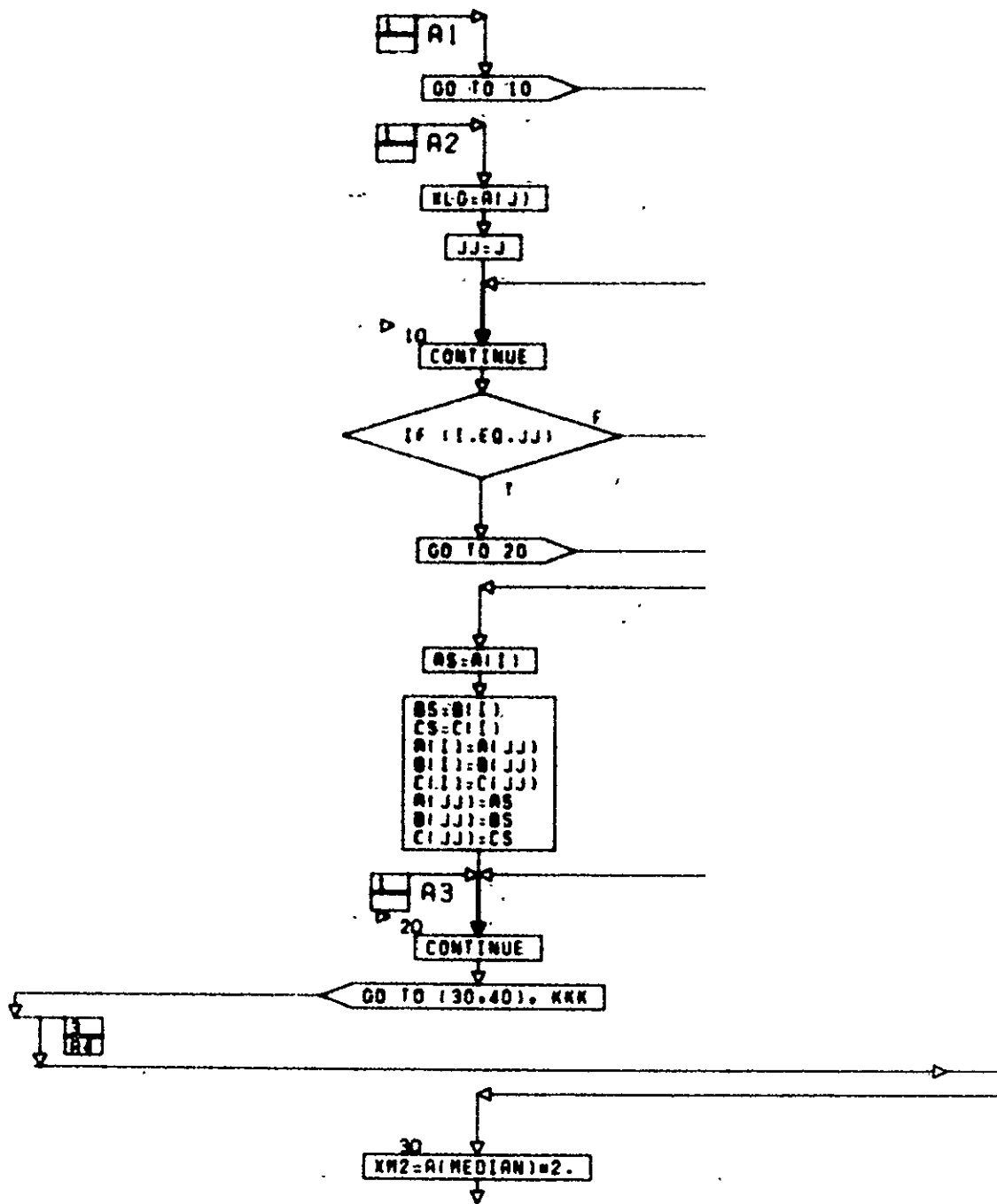
PG 20 OF 21





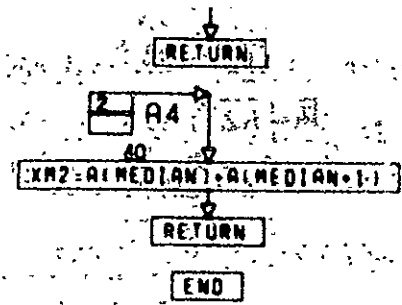
CONT. ON PG 2

PG 1 OF 3



CONT. ON PG 3

PG 2 OF 3



PG 3 FINAL

```

SUBROUTINE MIS (PIC,IERR,IERR,NCONF,ICHOSE,NCHOSE)
DIMENSION (PIC(2),ICHOSE(2),NCONF(6),NCHOSE(2))
COMMON /USER3/BTWN,SCSFL,TPRFL,OPSMS,ARRAYN(1,3),NASEQ

```

```

COMMON /BTWN/WT,VOL,DT,DX,DX,DX,KJ,YJ,ZJ,RJ,FF,TI,PL,PLIN,
LHDD,AREA,SATLO,WATE,NC,ACSNP,HARNMT,THCMT,CONVMT,TKMT,PASSTR,
SATMT,TPRIN,IBTLOC,RADA,RADAB,RAT,HTPRR,HTPRB,
HPT,HTPIE,YCMP,HTPT,FC,XNZERO,COMRT,ACSSN,BITRAT(2),
EQBLO,SABLO,SATMT

```

```

COMMON /DBCOM/ID(30),DATA(55,90)

```

```

COMMON /CHOSE/ICHOSE(60),NCHOSE(60),COST(5,60),REL(6,60),
THN(4,60),ARRAY(1,60),SKD(7,60)

```

```

COMMON /MISTAB/HSRT(60),TLPTH(60),GRANH(60),XSRT(60),TLPTL(60),OR
ANL(60)

```

C	INPUT	CDPI	T	D	SOURCE	UNITS	DESCRIPTION
C	VAR.	IN.					
C	GRANH	36	R	Y	ALL S/S		GRANULARITY HIGH RATE TABLE
C	HSRT	35	R	Y	ALL S/S	SPS	SAMPLE RATE HIGH TABLE
C	TLPTH	34+35	R	Y	ALL S/S		NO OF ANOL AND DIG POINTS HIGH
C	GRANL	40	R	Y	ALL S/S		GRANULARITY LOW RATE TABLE
C	XSRT	39	R	Y	ALL S/S	SPS	SAMPLE RATE LOW TABLE

C	TLPTL	37+38	R	Y	ALL S/S		NO OF ANOL AND DIG POINTS LOW
C	SCSFL		R		U		SPECIAL COMMAND SYNC FLAG
C	TOTCM	307032	R		DB		TOTAL NO OF COMMANDS
C	COMTY		R		MACRO		NCONF(3) - SPEC OR GEN COMPUTER FLAG
C	ITCPL	32	R				TIME TAG COMMAND FLAG
C	TPRFL		R		U		TELEN PROCESS FLAG
C	ACSSN		R		SC		SUR OF ACS SENSOR
C	COMRT		R		COMM		COMMAND RATE

C	OPSMS		R		U	SEC-1	MISSION OPS
C	MISPD		I		U		MISSION DATA PROC. FLAG
C							ERROR FLAGS
C							IERR = 1 MUX IS REQUIRED
C							IERR = 10 WORD LENGTH GREATER THAN 256
C							IERR = 100 BIT RATE IS TOO LARGE
C							IERR = 1000 SPECIAL COMMAND SYNC FLAG IS NOT EQUAL TO ZERO
C							IERR = 10000 JI .GE. JIE

```

IERR=0
IERR1=0
IERR2=0
IERR3=0
IERR4=0
IERR5=0
ANOLH=0.
ANOLL=0.

```

```

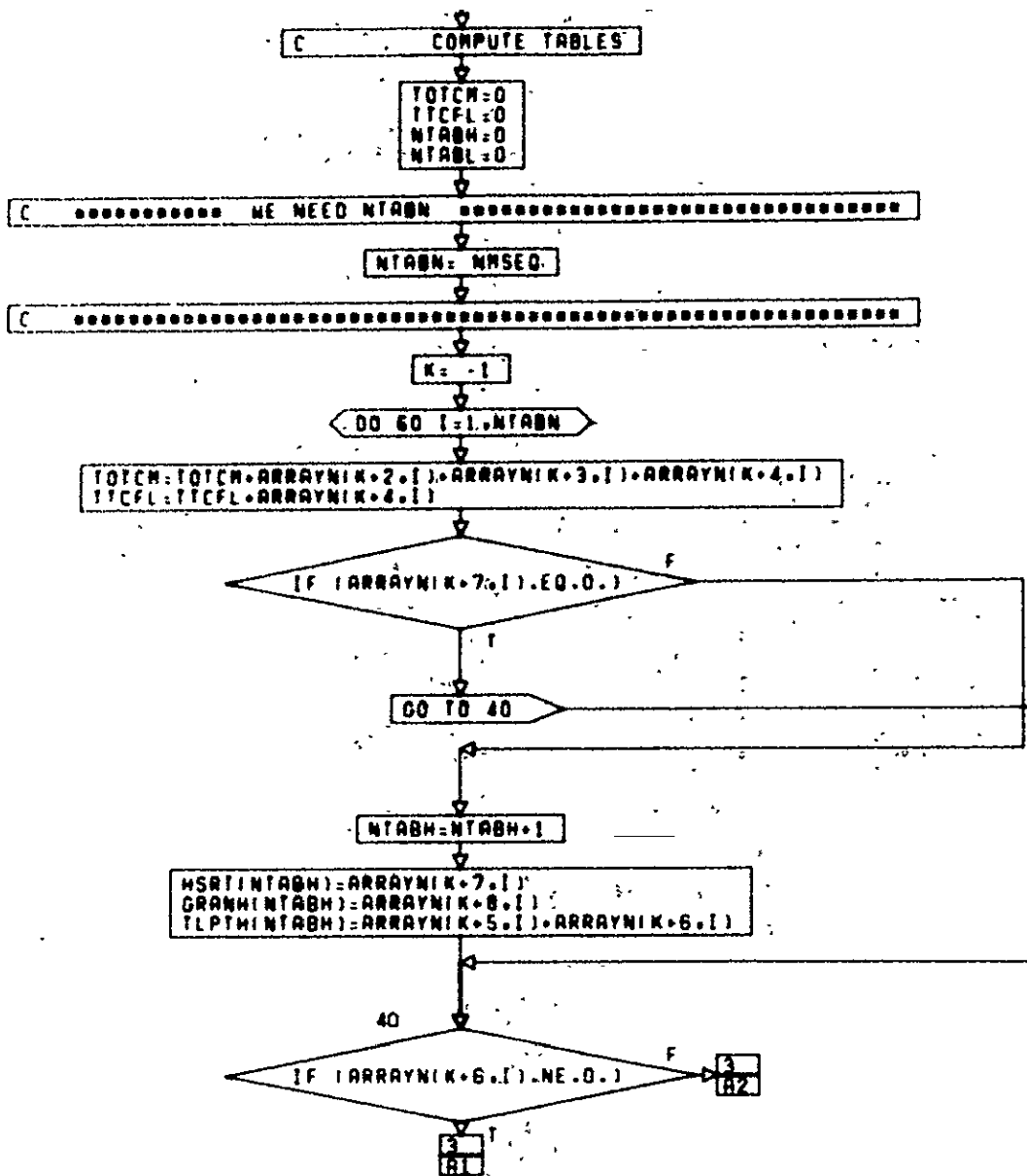
MUX=0

```

CONT. ON PG 2

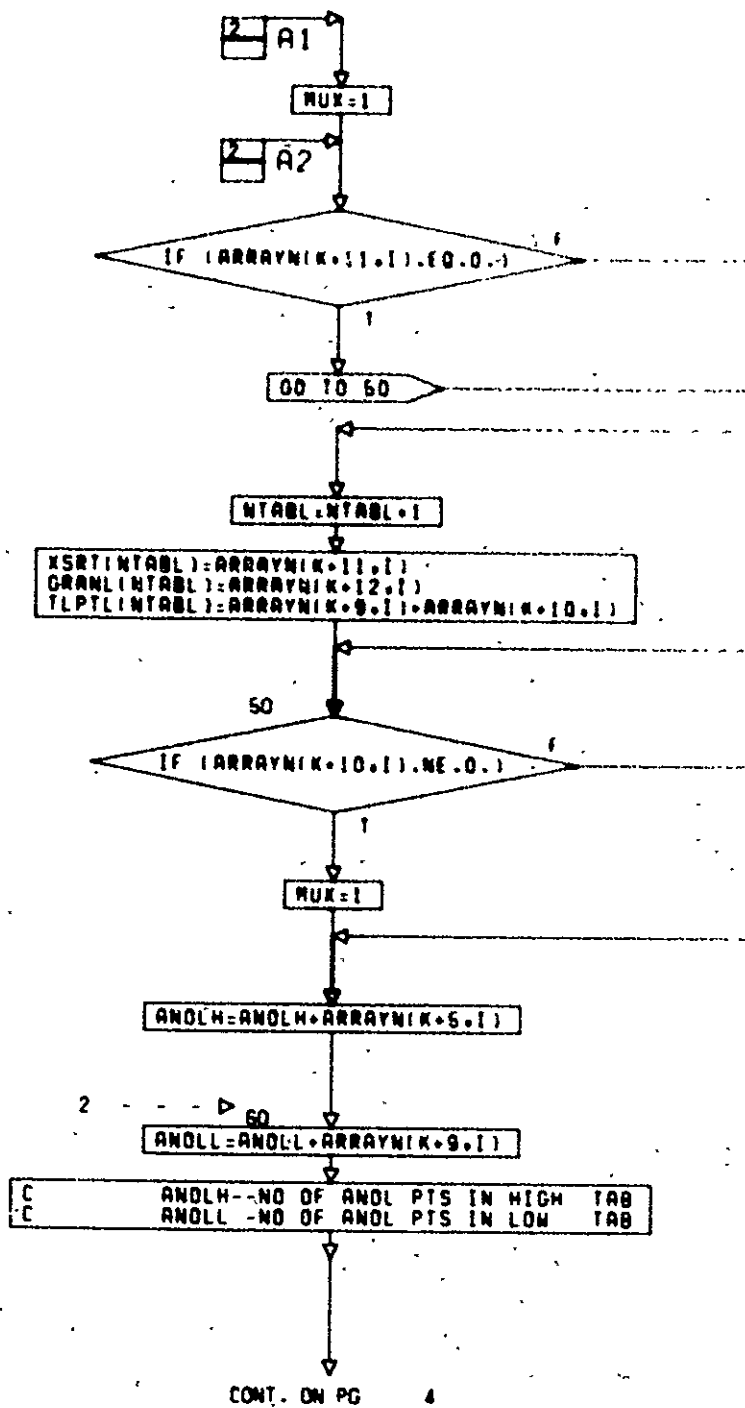
PG 1 OF 12

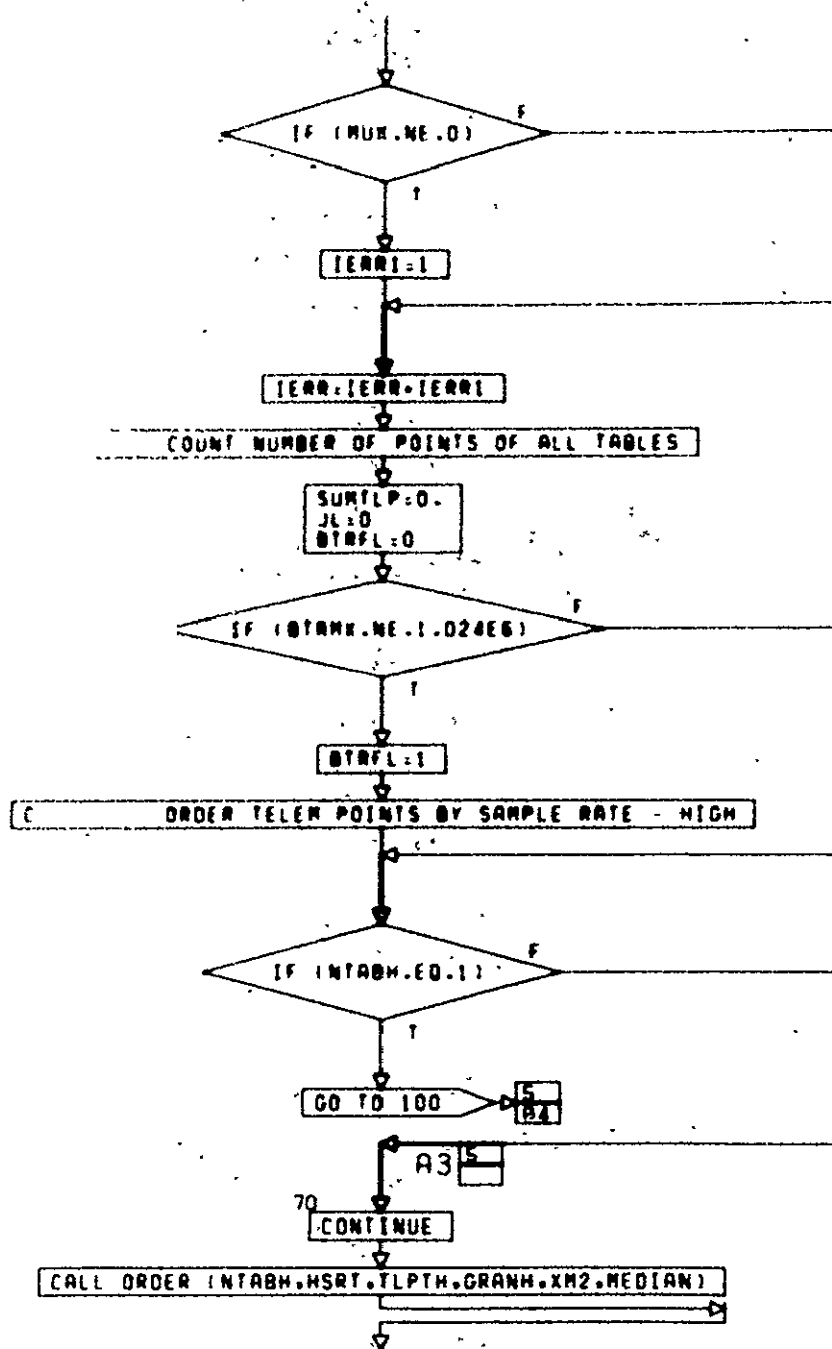




CONT. ON PG 3

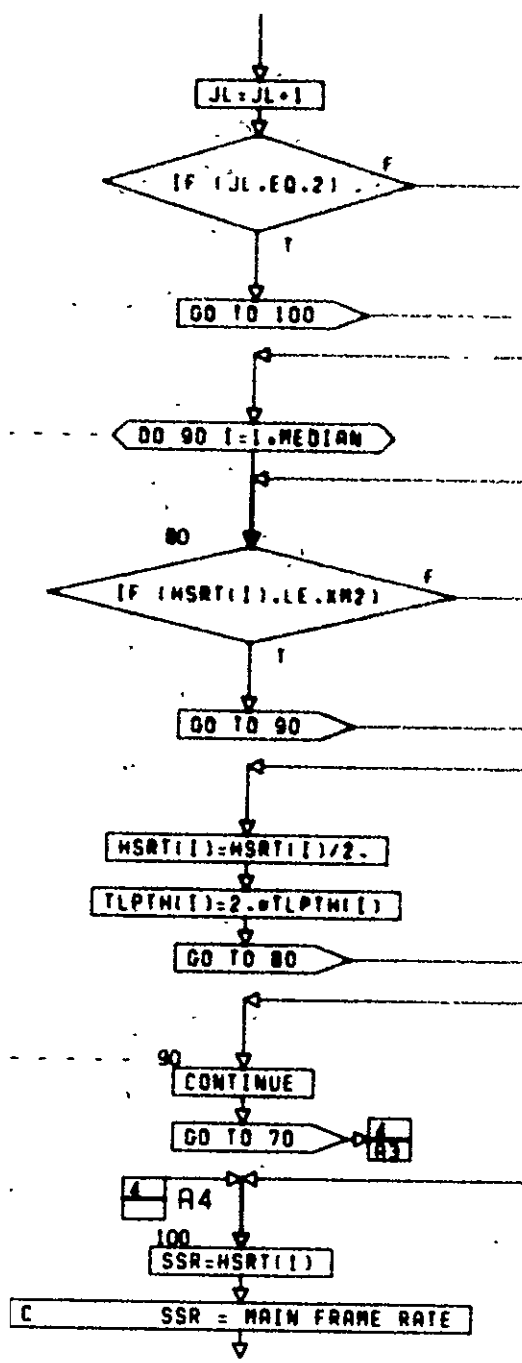
PG 2 OF 12



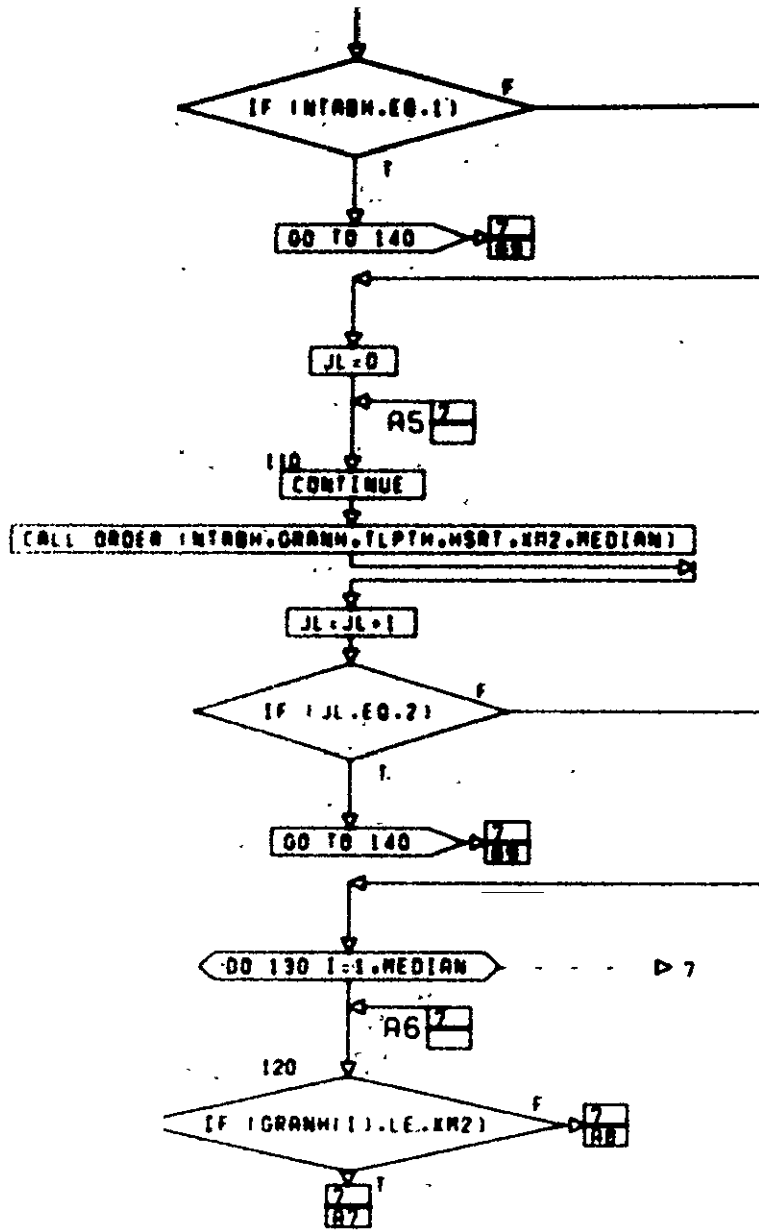


CONT. ON PG 5

PG 4 OF

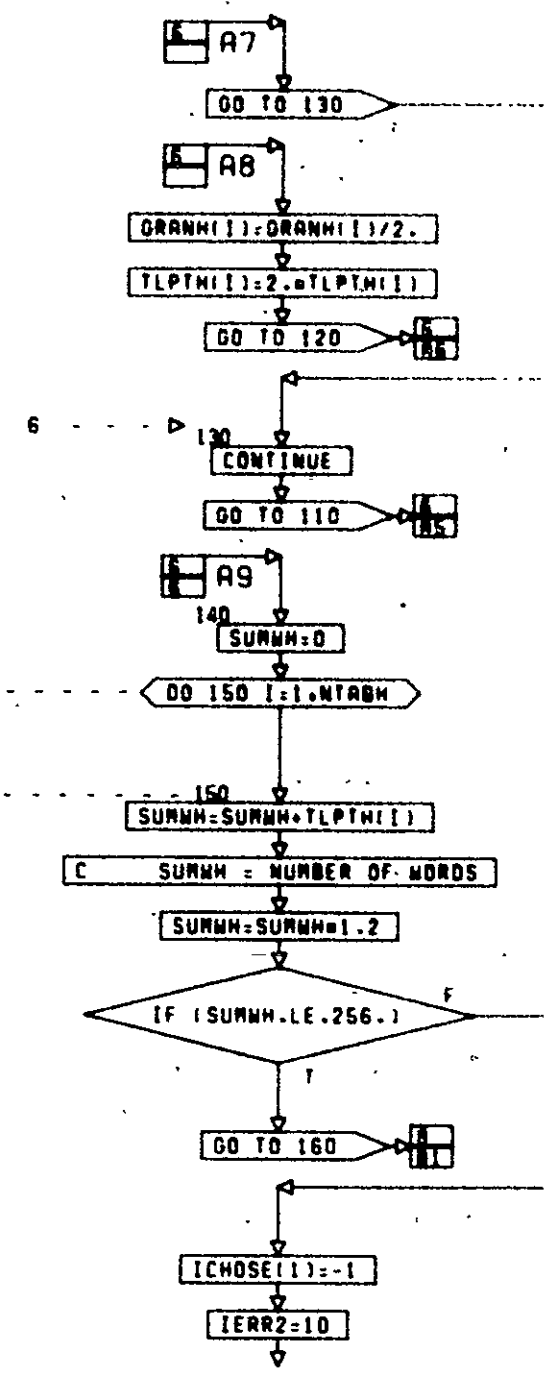


CONT. ON PG 6

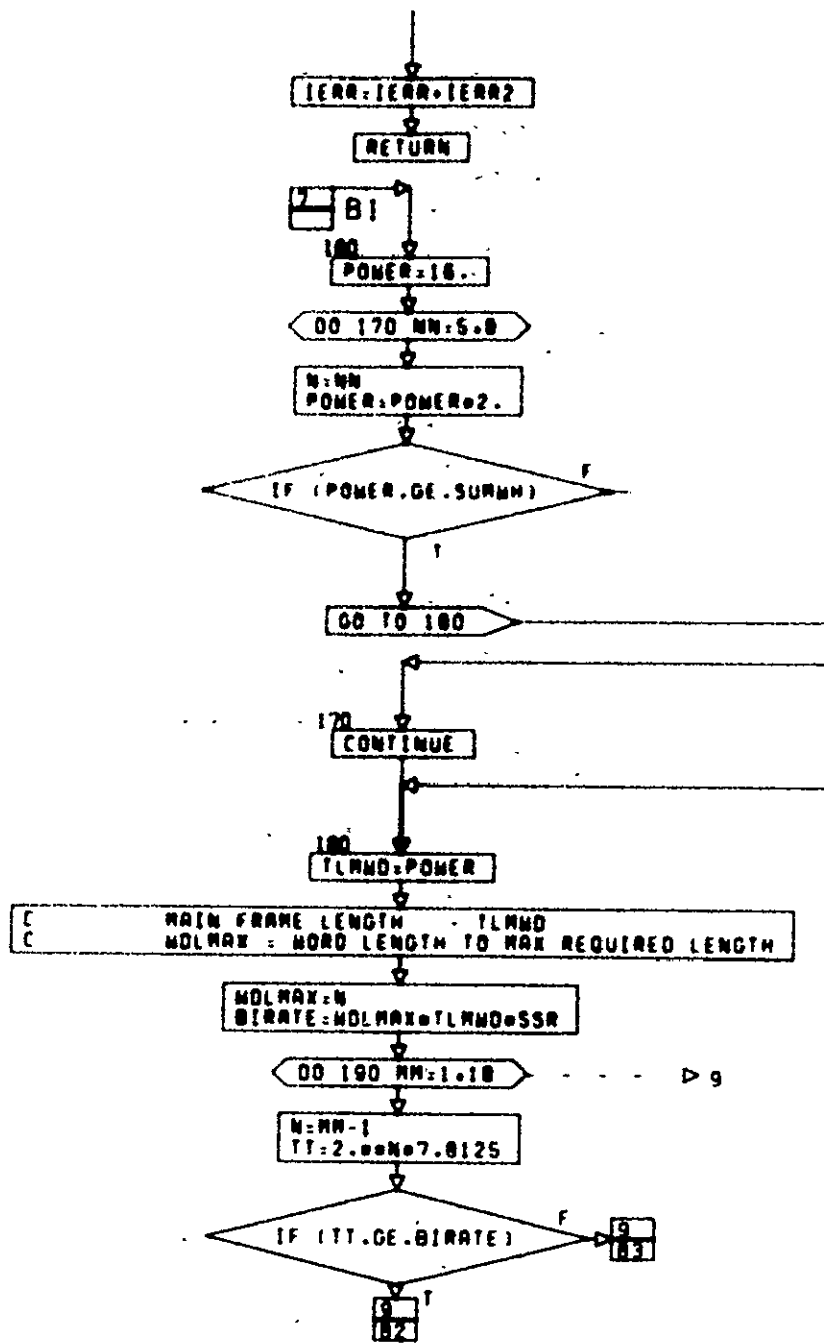


CONT. ON PG 7

PG 6 OF 12

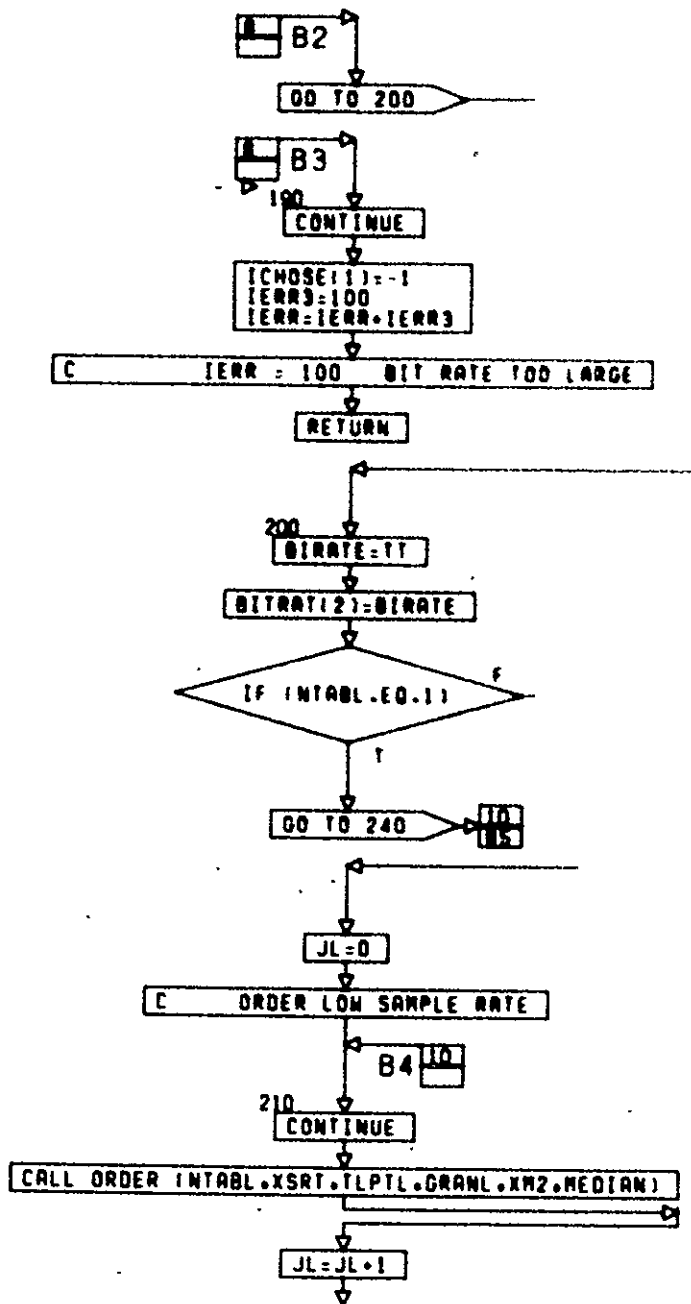


CONT. ON PG 8



CONT. ON PG 9

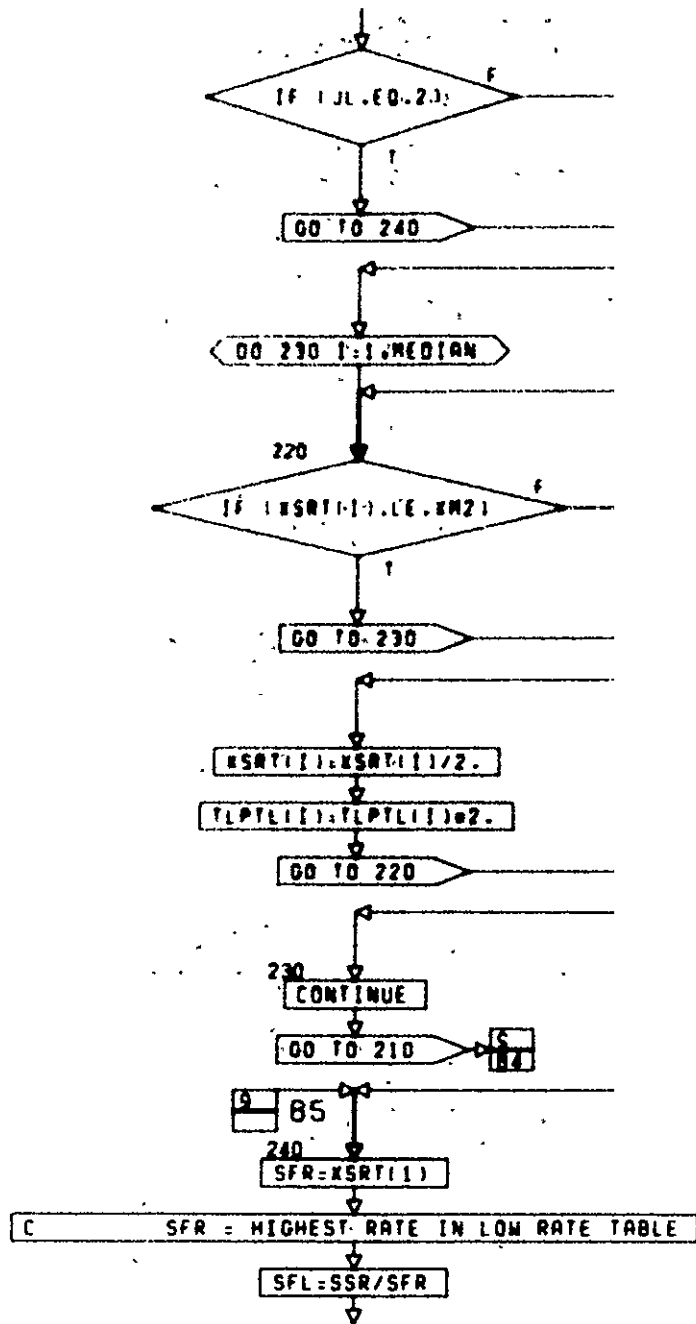
PG 8 OF 12



CONT. ON PG 10

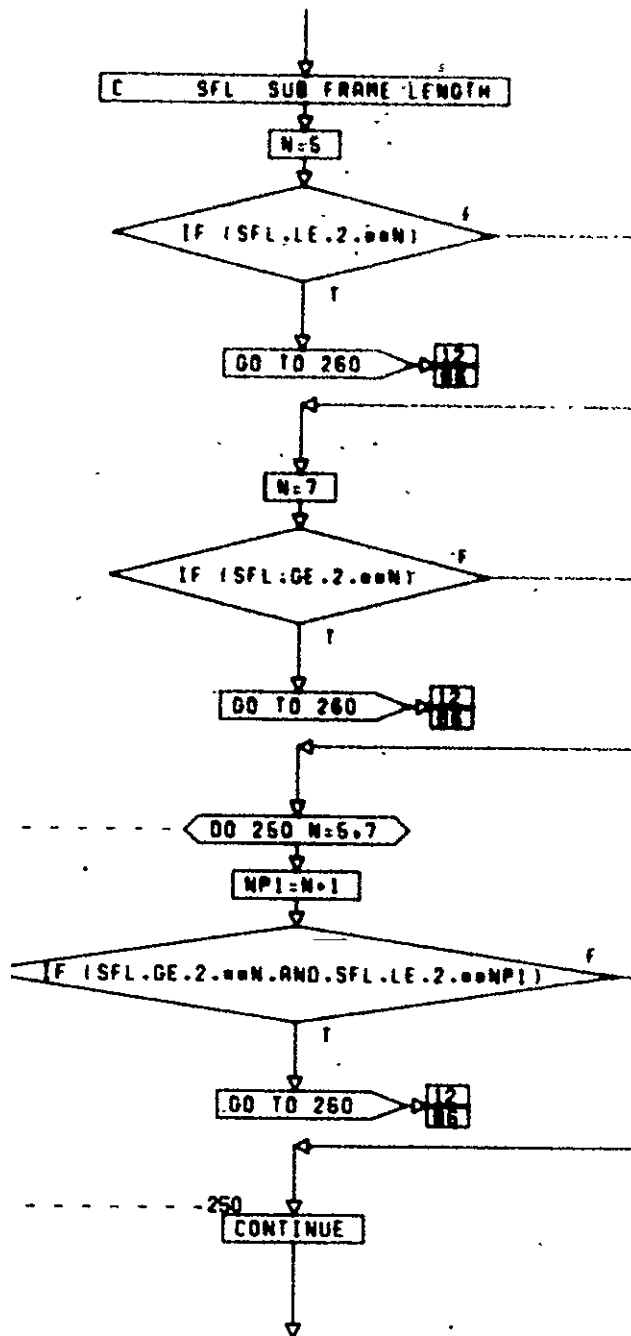
PG 9 OF 12





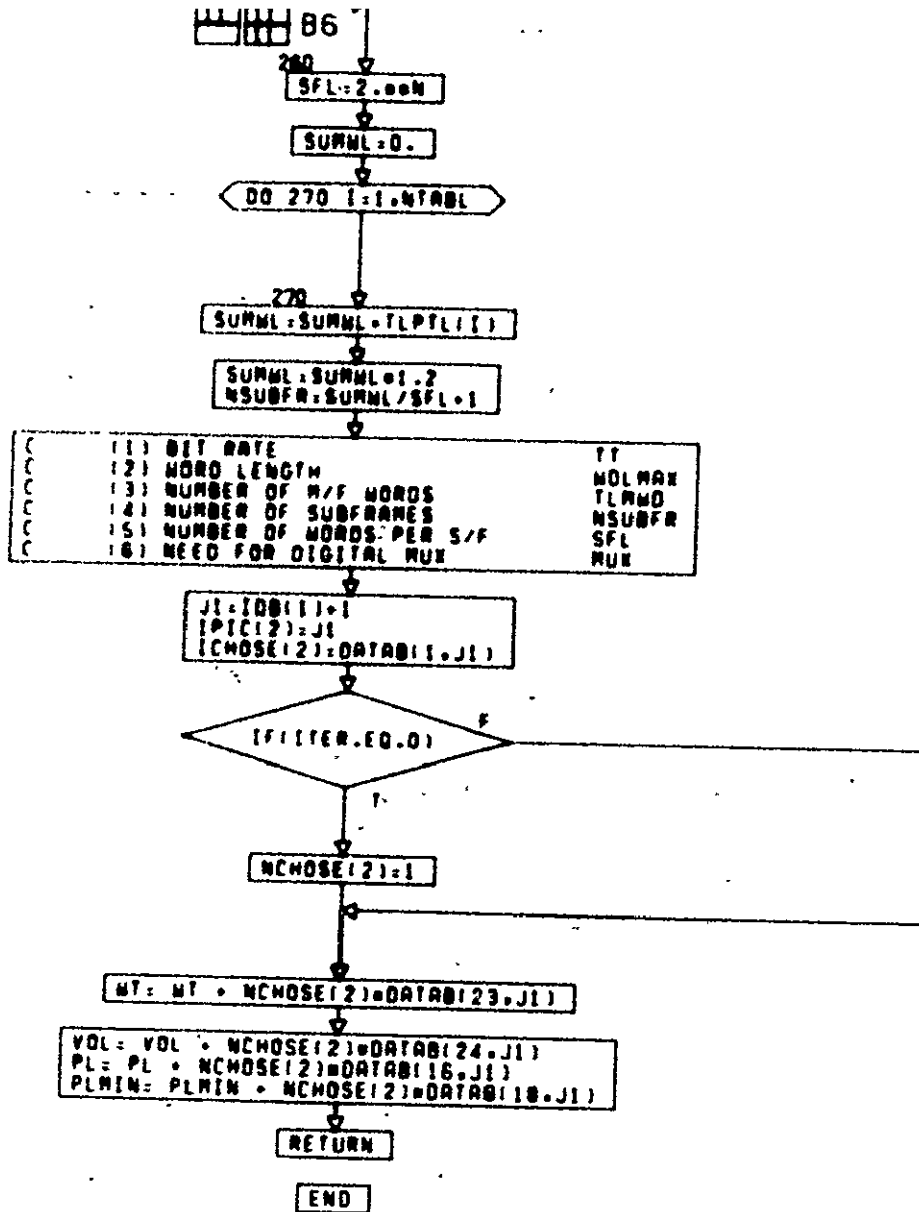
CONT. ON PG 11

PG 10F 12



CONT. DN PG 12

PG 1 OF 12



PG 12 FINAL

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