A STRUCTURAL WEIGHT ESTIMATION PROGRAM (SWEEP) FOR AIRCRAFT. VOLUME II - PROGRAM INTEGRATION AND DATA MANAGEMENT MODULE. PART 1: PROGRAM INTEGRATION

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20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Three computer programs were written with the objective of predicting the structural weight of aircraft through analytical methods. The first program, the structural weight estimation program (SWEEP), is a completely integrated program including routines for airloads, loads spectra, skin temperatures, material properties, flutter stiffness requirements, fatigue life, structural sizing, and for weight estimation of each of the major aircraft structural components. The program produces first-order weight estimates

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and indicates trends when parameters are varied. Fighters, bombers, and cargo aircraft can be analyzed by the program. The program operates within 100,000 octal units on the Control Data Corporation 6600 computer. Two stand-alone programs operating within 100,000 octal units were also developed to provide optional data sources for SWEEP. These include (1) the flexible airloads program to assess the effects of flexibility on lifting surface airloads, and (2) the flutter optimization program to optimize the stiffness distribution required for lifting surface flutter prevention.

The final report is composed of 11 volumes. This volume (Volume II) contains the methodology, program description, and user's information for the SWEEP control program, input data processing module, final output module, and the data management module.

PREFACE

This report was prepared by Rockwell International Corporation, Los Angeles Aircraft Division, Los Angeles, California, under Contract F33615-71-C-1922, No. FX2826-71-01876/C093. The work was performed for the Deputy for Development Planning, Air Force System Command, Wright-Patterson Air Force Base, Ohio, and extended from September 1971 to June 1974.

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The final report was published in 11 volumes; the complete list is as follows:

Volume	
I	"Executive Summary"
II	"Program Integration and Data Management Module"
III	"Airloads Estimation Module"
IV	"Material Properties, Structure Temperature, Flutter, and Fatigue"
V	"Air Induction System and Landing Gear Modules"
VI	"Wing and Empennage Module"
VII	"Fuselage Module"
VIII	"Programmer's Manual"
IX	"User's Manual"
X	"Flutter Optimization Stand-Alone Program"
XI	"Flexible Airloads Stand-Alone Program"

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INTRODUCTION TO VOLUME II

The structural weight estimation program (SWEEP) has been developed as an analytical aircraft structural weight prediction tool suitable for use in the preliminary design phase of vehicle synthesis. The functions of data development and assessment have been integrated into various program modules so that criteria, design constraints, and environment considerations are consistent. The purpose of the two parts of this volume is to present the program structure, data processing methods, and interfaces between the different program modules.

- Part 1 discusses the SWEEP program arrangement and structure, SWEEP control program, input data processing module, and the final output module.

- Part 2 discusses the data management module, which organizes geometry, inertia, and design criteria for use by the data development and weight analysis modules. The appendix contains program flow charts and FORTRAN lists for the data management module.

PART I

PROGRAM INTEGRATION

Section I

INTRODUCTION

The analytical structural weight prediction procedure in SWEEP is an integration of methods formulated to describe design criteria and constraints of aircraft components, synthesize structure to these requirements, and develop mass properties data. Various procedure, engineering methods, and computer programming techniques used in SWEEP provide comprehensive structural weight data in a single computer run.

The program is structured in a modular form which provides the user with multiple modes of operation. It is designed to operate as a fully integrated system such that compatible design constraints are satisfied by each of the structural components. SWEEP can also be used in stand-alone modes to evaluate individual components or develop design criteria. A stacked case capability is also provided which permits variation of any single design parameter without repeating other data.

SWEEP consists of modules which perform control and/or computational functions required for:

1. Master control
2. Input/output data processing
3. Vehicle performance data analysis
4. Vehicle geometry and initial weight distribution analysis
5. Basic flight design loads and fatigue spectrum analysis
6. Fatigue and flutter requirement analysis
7. Material property descriptions and evaluation
8. Wing and empennage structural synthesis and weight analysis
9. Fuselage structural synthesis and weight analysis
10. Landing gear structural synthesis and weight analysis
11. Air induction system (nacelles, pylons, engine section, ducts, ramps, spikes) structural synthesis and weight analysis

Geometry definitions are based on mathematical approximations of vehicle physical features and structural arrangements. These definitions provide for weight sensitivity to configuration geometry and to geometric variations. The structural synthesis/weight analysis modules are designed to analytically evaluate design requirements and criteria and to synthesize structures for specified materials and structural concepts. Structural elements are analyzed to satisfy strength, stiffness, life, local stability, and general stability requirements. The synthesis can be controlled to produce material sizing reflecting unconstrained "optimum" structural arrangements or to evaluate material requirements for design constraints resulting from compromises due to cost, producibility, maintainability, or unique local considerations. Some of these design constraints are:

1. Specified frame, stringer, rib, or spar spacings
2. Longeron locations
3. Frame or stringer geometry limits
4. Material minimum gages or fabrication minimums
5. Cutout sizes and locations
6. Bulkhead locations

Program logic is provided so that options are available to (1) control the scope of the analysis and the types of design information to be printed, and (2) provide for bypassing certain design data computations by inputing the pertinent information. The latter approach would be employed to substitute advanced engineering data which become available during the design cycle. Examples of this type of data are local description of geometry, gross design or net loads, and flutter stiffness requirements.

Section II

PROGRAM DESCRIPTION

PROGRAM STRUCTURE

SWEEP is an integrated program written in FORTRAN IV for the CDC 6600 computer system. It is programmed in modular form using one level of overlay. The main overlay consists of the SWEEP control program, OLAY00, which is identified as Overlay (0,0). Specific control, data manipulation, and computation functions are performed in subprograms identified as overlays (n,0), where n is the unique integer assigned to each primary overlay.

The basic program is structured to operate within a total of 50,000 octal (20,480 decimal) core locations. The appended version, SWEEP IV, which incorporates the additional capability of analyzing advanced composite wing and empennage structures, operates within a total of 100,000 octal core locations.

In order to operate within the foregoing CDC computer core size restriction, certain analysis functions are performed by groupings of (n,0) overlays. The designation "module" is assigned to unique function overlays and to groupings of functional overlays. Table 1 shows the 18 primary overlays which constitute the 10 program modules. Overlay (18,0) in this table is the advanced composite structure link. This is the only link structured to the 100,000 octal core size restriction.

Program computation flow through the input data processing, data development, weight analysis, and output modules is shown in Figure 1. Sequential flow diagram through the 17 primary overlays and all of the data processing and computational routines within each overlay are shown in Figure 2. Table 2 is a descriptive listing of all SWEEP routines.

DATA PROCESSING

Blank common, labeled common, and mass storage files are used for the placement and retrieval of data. These media are readily made accessible to any unit of the program. Data sets are assigned to specific regions in blank common for each module, and are maintained in multioverlay modules by the use of the BUFFER IN/BUFFER OUT statements.

TABLE 1. MODULE DESIGNATION AND GROUPING

Module Name	Module Type	Overlay	Control Routine Name
Input data processing	Input processing	(01,0)	READ
Data management	Data development	(02,0)	DATAIN
Flutter and temperature	Data development	(03,0)	OLAY3
Airloads	Data development	(04,0)	BLCNTL
Fatigue	Data development	(05,0)	FATGUE
Landing Gear	Weight analysis	(06,0)	LANDGR
Air induction system	Weight analysis	(07,0)	AISMN
Wing and empennage	Weight analysis	(08,0) (09,0) (10,0) (14,0) (15,0) (16,0) (17,0) (18,0)	OLAY8 OLAY9 OLAY10 OLAY14 OLAY15 OLAY16 OLAY17 OLAY18
Fuselage	Weight analysis	(11,0) (12,0)	FUS01 FUS02
Final output	Output	(13,0)	OUTPUT

Problem analysis controls and certain design data items are stored in labeled common blocks. These blocks are in the main overlay and thus reside in core at all times and are universally accessible.

Mass storage file records are used to transmit design information between the input data processing module, design data development modules, weight analysis modules, and the output module. These records are also used within modules for temporary storage of data sets. Use of these files provides a means of transmitting the large amount of data required by this program within the restriction on core size.

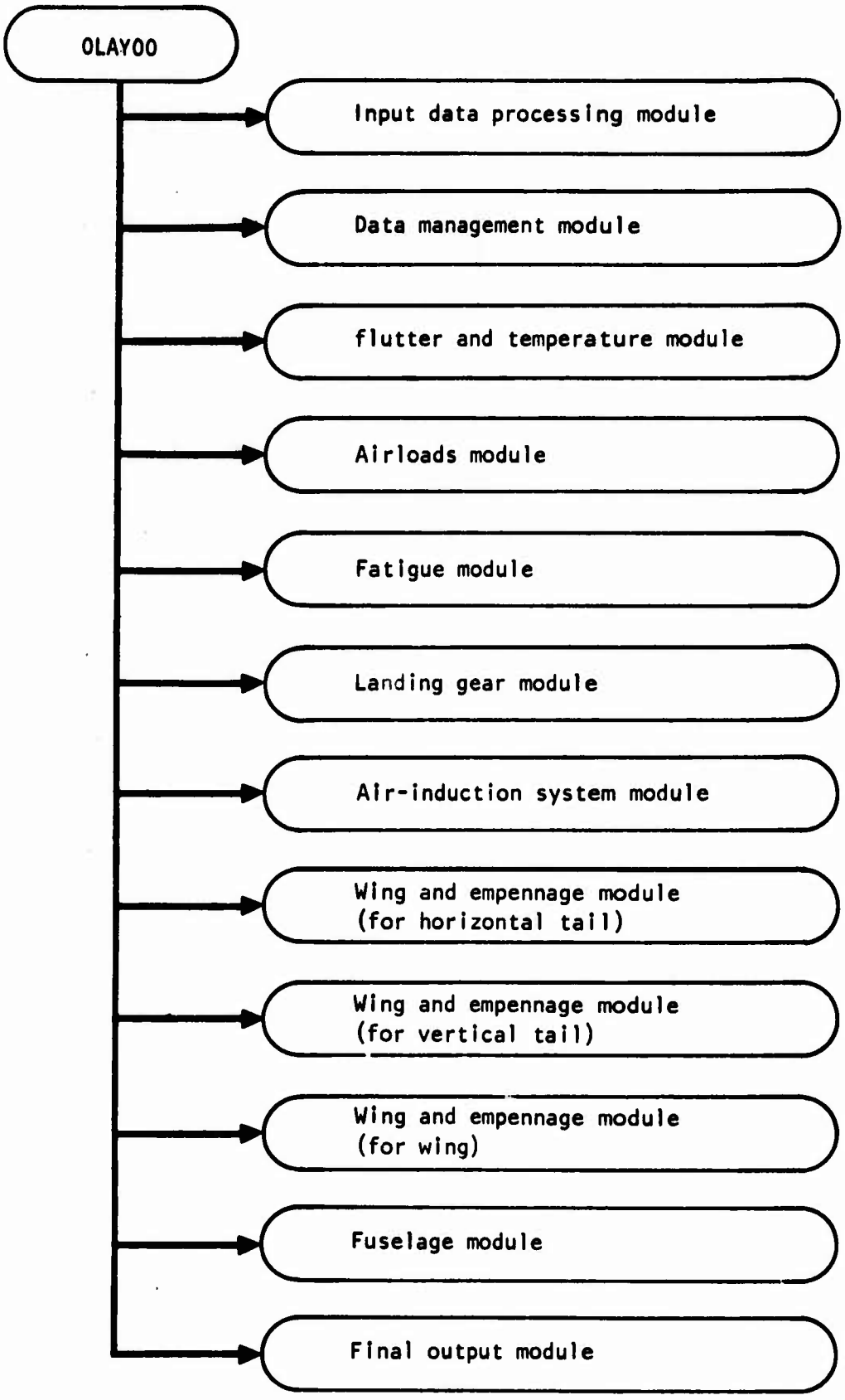


Figure 1. Main overlay - SWEEP overlay control program.

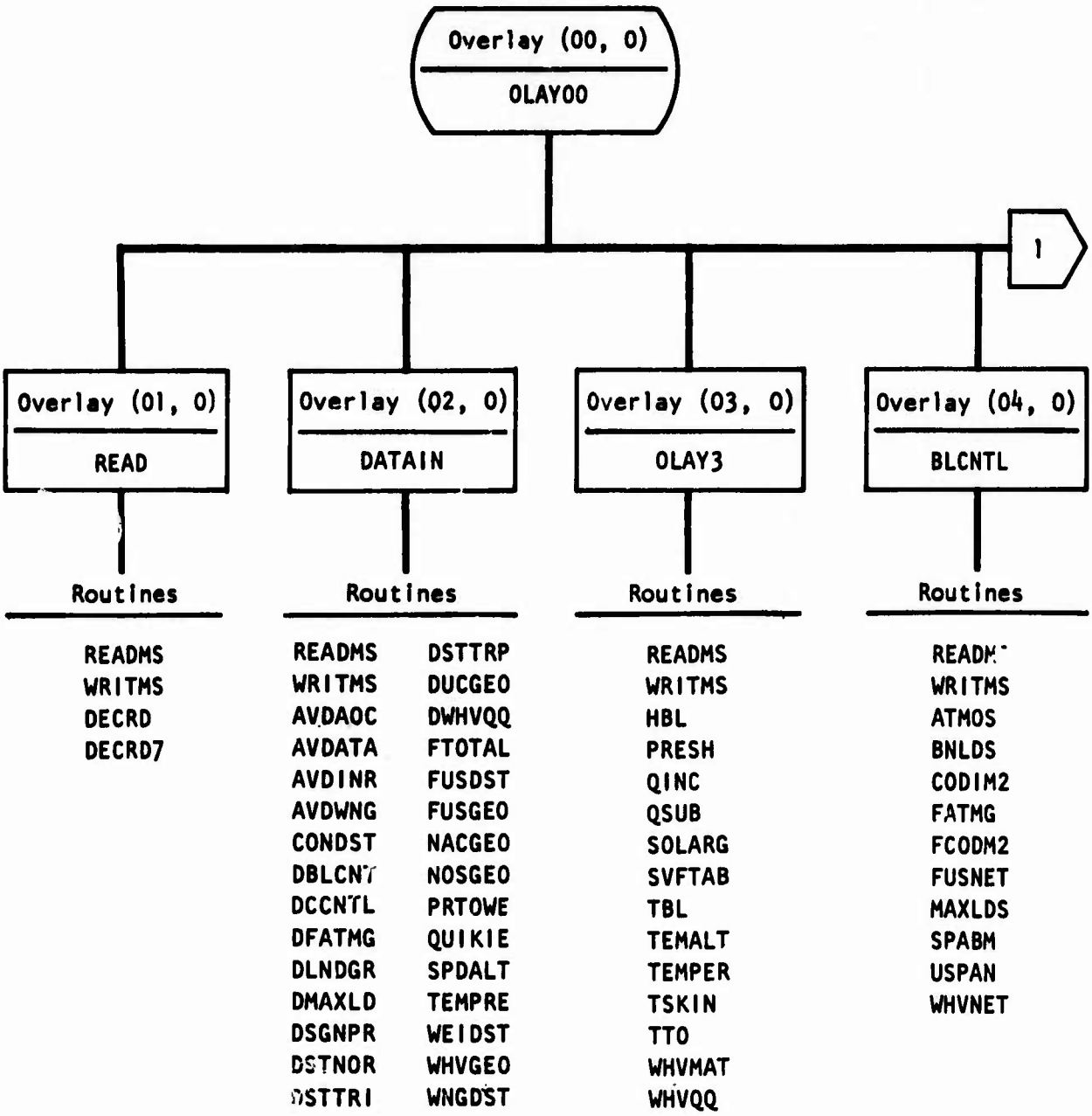


Figure 2. SWEEP overlay structure.

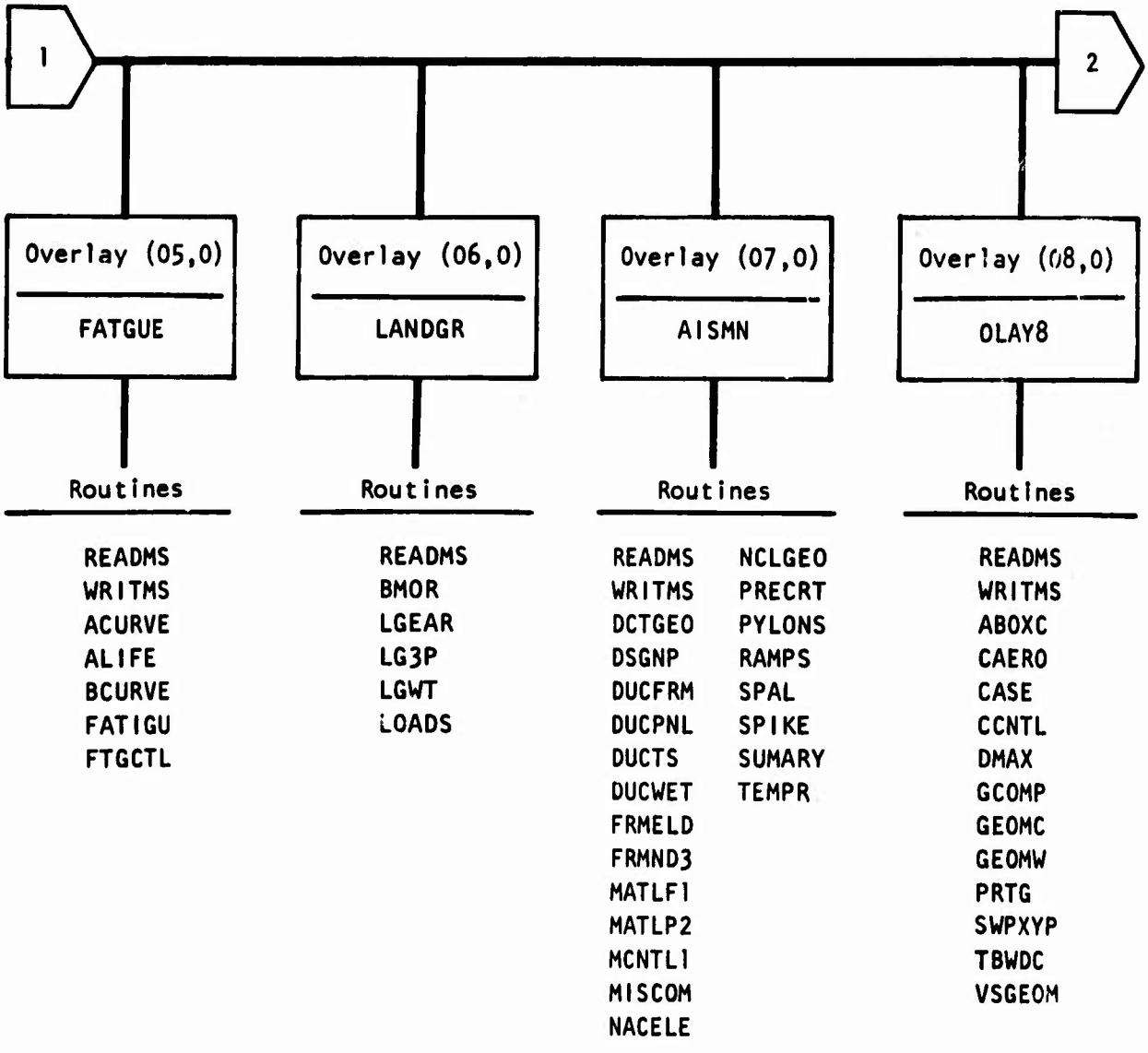


Figure 2. SWEEP overlay structure (cont).

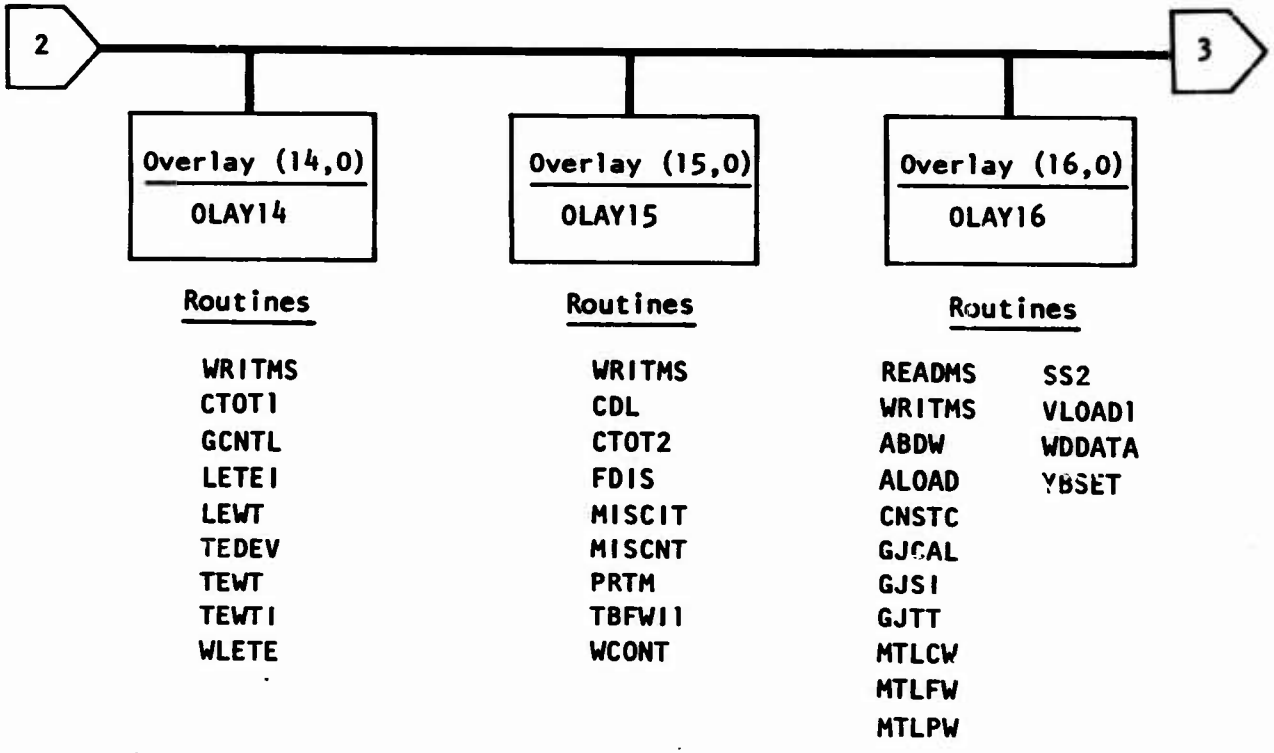


Figure 2. SWEEP overlay structure (cont).

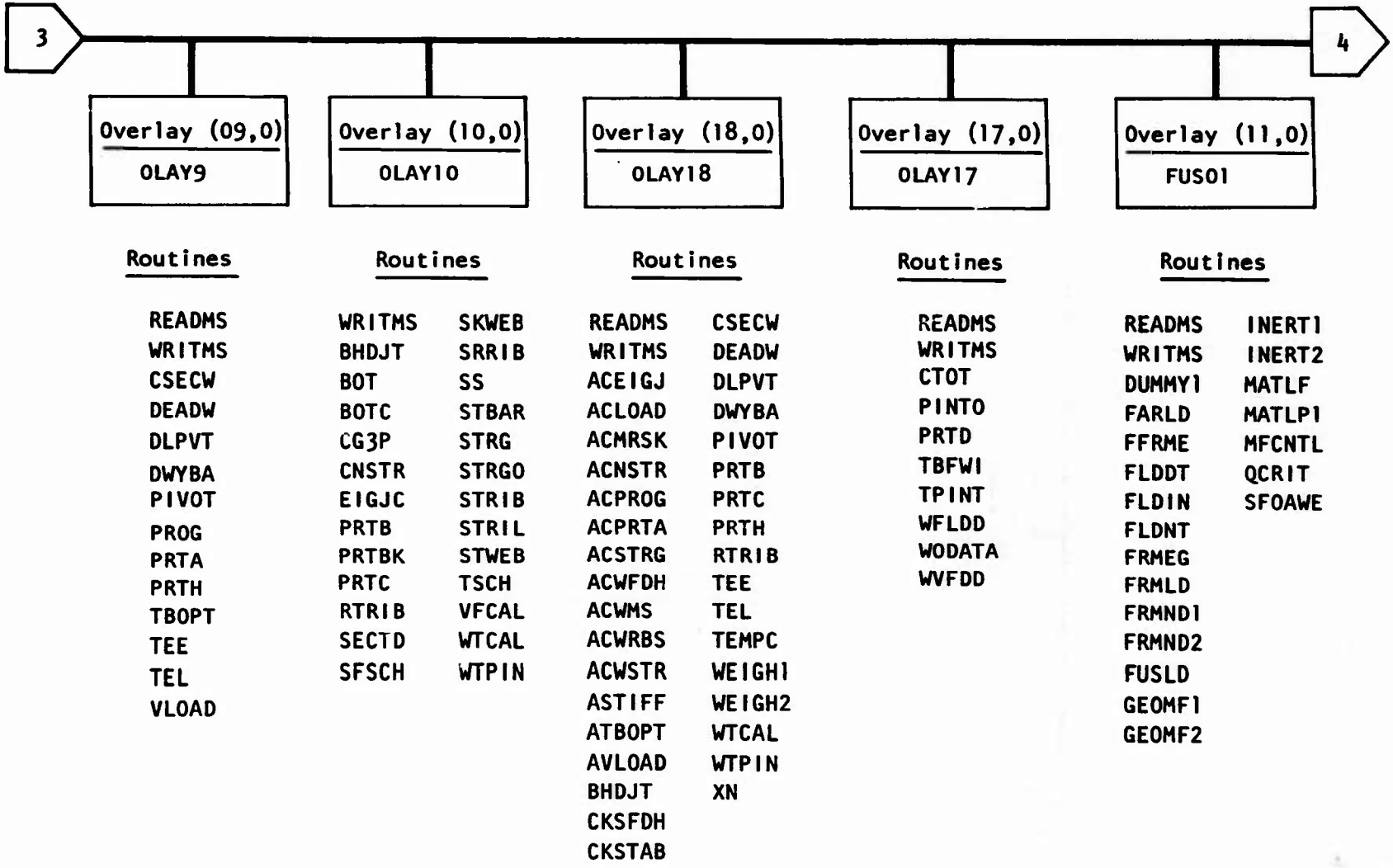
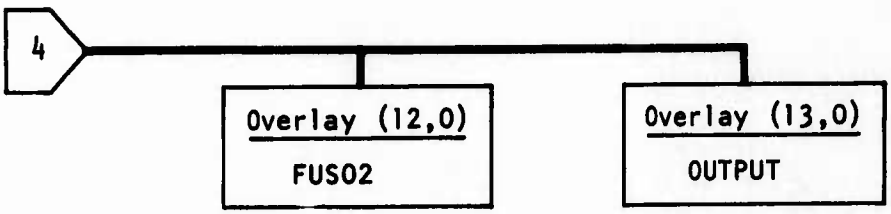


Figure 2. SWEEP overlay structure (cont).



Routines

READMS
BLKHDS
CUTOUT
CVPRES
DBLKHD
FBEND
FCOVER
FHCMB
FPANEL
FUSSHL
FWEIGH
GJ1GEO
GJ2GEO
I1LONG
I2LONG
LDCHK
LONGS
MINFR
MINMUM
MISCWT
PARTIT
SECOST
SPRINT
SUMMRY
WTDIST

Routines

READMS

Figure 2. SWEEP overlay structure (concl).

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES

DECK NAME	OLAY	- • - • - DESCRIPTION - • - • - • - • - • - • - • -
OLAY00	00	SWEEP OVERLAY CONTROL PROGRAM
READ	01	PROGRAM FOR INPUT DATA PROCESSING MODULE
DECRD	01	RELATIVE READ FOR INPUT STREAM
DECRD7	01	RELATIVE READ FOR TAPE 7
DATAIN	02	PROGRAM FOR DATA MANAGEMENT MODULE• FLOW CONTROL
AVDAOC	02	ADD OTHER COMPONENTS• FOR SUBROUTINE AVDATA•
AVDATA	02	DEVELOP TOTAL VEHICLE WEIGHT• CG• AND INERTIA DATA•
AVDINR	02	CALCULATE INERTIAS FOR SUBROUTINE AVDATA•
AVDWNG	02	WING AND CONTENTS WEIGHT AND CG FOR SUBROUTINE AVDATA
CONDST	02	DISTRIBUTION OF FIXED FUS• CONTENTS TO SYNTHESIS SEGS•
DBLCNT	02	PUT VEHICLE DATA IN BC ARRAY AS REQ• FOR AIRLOADS MOD•
DCCNTL	02	SAVE WING AND TAILS GEOM•• EST•WT• AND CG FOR WHV MOD•
DFATMG	02	SAVE WT•RATIOS•MOMENTS•ETC• FOR FATIGUE -AIRLOADS MOD•
DLNDGR	02	SAVE DATA FOR LANDING GEAR MODULE
DMAXLD	02	1G INERT• SHEAR•TORQUE•BEND•MOM• AT CUTS FOR WHV MOD•
DSGNPR	02	SETUP TEMP• AND PRESS• FACTORS FOR AIR INDUC• SYSTEM•
DSTNOR	02	DISTRIBUTE POINT WEIGHT BY STATION SPACING•
DSTTRI	02	TRIANGULAR DISTRIBUTION OF POINT WT• TO STATIONS•
DSTTRP	02	TRAPEZOIDAL DISTRIBUTION OF POINT WT• TO STATIONS•
DUCGEO	02	DEVELOP DUCT GEOMETRY•
DWHVQQ	02	SAVE SPEED-ALT• AND H-TAIL DATA FOR FLUT•-TEMP• MOD•
FTOTAL	02	DISTRIBUTE FUSELAGE USEFUL LOAD AND CONTENTS FOR 3 WTS
FUSDST	02	DISTRIBUTION OF FUSELAGE STRUCTURAL WEIGHT TO SYN•SEGS
FUSGEO	02	DEVELOP EXTERNAL SHELL GEOMETRY•
NACGEO	02	DEVELOP NACELLE GEOMETRY•
NOSGEO	02	DEFINE GEOMETRY OF NOSE SECTION•
PRTOWE	02	PRINT OPERATIONAL WEIGHT EMPTY AND EXPEND• USEFUL LOAD
QUIKIE	02	FIRST PASS WEIGHT AND C•G• ESTIMATES•
SPDALT	02	SETUP TEMP• AND PRESS• FOR 9 PT• SPEED PROFILE•
TEMPRE	02	TEMPERATURE AND PRESSURE FOR GEOPOTENTIAL ALTITUDE•
WEIDST	02	INITIAL DIST• OF OPER• WT• EMPTY TO COMPONANTS
WHVGEO	02	DEVELOP GEOMETRY OF WING• HORIZONTAL AND VERTICAL
WNGDST	02	WEIGHT DISTRIBUTION FOR WING AND CONTENTS•

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	- • - • - DESCRIPTION - • - • - • - • - • - • - • -
OLAY3	03	PROGRAM FOR FLUTTER AND TEMPERATURE MODULE
HBL	03	BOUNDARY LAYER HEAT TRANSFER
PRESH	03	PRESSURE AT ALTITUDE
QINC	03	INCOMP• DYNAMIC PRESH• FOR MACH• LOC•PRESH•• LOC•TEMP•
QSUB	03	DESIGN DYNAMIC PRESH• CORRECTED FOR COMPRES• EFFECTS
SOLARG	03	SUN FLUX AS FUNCTION OF ALTITUDE
SVFTAB	03	INTERPOLATED FLUTTER PARAMETER FOR EACH SURFACE
TBL	03	TEMPERATURE OF BOUNDARY LAYER
TEMALT	03	LOCAL TEMPERATURE AT ALTITUDE
TEMPER	03	CONTROL SKIN TEMP• ITTERATION FOR A MACH AND ALTITUDE
TSKIN	03	SKIN TEMPERATURE
TTO	03	TOTAL TEMPERATURE FUNC• MACH AND LOCAL TEMP•
WHVMAT	03	TEMP• VS• COMPRESSION YIELD STRESS AND SHEAR MODULUS
WHVQQ	03	CONTROL FOR COMPRES• CORRECTION FOR Q• SHEAR MODULUS
BLCNTL	04	PROGRAM FOR AIRLOADS MODULE• LOGIC AND CONTROL
ATMOS	04	ATMOSPHERE• RETURNS DENSITY•PRESSURE•TEMP• FOR ALT•
BNLDS	04	COMPONENT TOTAL AIRLOADS AND CP•S• AND INERTIA FACTORS
CODIM2	04	INTERPOLATION BETWEEN POINTS OF A CURVE
FATMG	04	BENDING MOMENT SPECTRA FOR MANEUVER• GUST AND TAXI
FCODM2	04	INTERPOLATION BETWEEN CURVES OF A FAMILY
FUSNET	04	SAVE SPECIFIC LOADS DATA FOR FUSELAGE MODULE
MAXLDS	04	NET DESIGN LOAD ENVELOPE FOR EACH LIFTING SURFACE
SPABM	04	WING AND EMPENN• SPANWISE SH-B•M-TOR• FROM AIRLOADS
USPAN	04	WING AND EMPENNAGE UNIT AIRLOAD DISTRIBUTIONS
WHVNET	04	NORMALIZING FACT• AND NET LOADS• SAVES FOR WHV MODULE
FATGUE	05	PROGRAM FOR FATIGUE MODULE
ACURVE	05	CYCLIC STRESS-STRAIN CURVE CALCULATION
ALIFE	05	LIFE CALCULATION BY STRAIN-CYCLING METHOD
BCURVE	05	STRAIN VS CYCLES-TO-FAILURE CURVE CALCULATION
FATIGU	05	INITALIZE• CONTROL ITERATION• PRINT FINAL RESULTS•
FTGCTL	05	GENERAL•SET UP STRESS LEVELS FROM BEND•MOM•OR PRESSURE

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	DESCRIPTION
LANDGR	06	PROGRAM FOR LANDING GEAR MODULE
BMOR	06	BENDING MODULUS OF RUPTURE
LGEAR	06	COMPUTE LANDING GEAR LOADS
LGWT	06	COMPUTE LANDING GEAR WEIGHTS
LG3P	06	THREE POINT INTERPOLATION
LOADS	06	COMPUTE LOADS PARALLEL AND PERPEND. TO STRUT EACH COND
AISMN	07	PROGRAM FOR AIR INDUCTION SYSTEM MODULE
DCTGEO	07	DUCT GEOMETRY EVALUATION
DSGNP	07	SETUP TEMP. AND PRESS. FACTORS FOR AIR INDUC. SYSTEM.
DUCFRM	07	DUCT FRAME SYNTHESIS
DUCPNL	07	DUCT PANEL SYNTHESIS
DUCTS	07	CONTROL AND PRINT FOR DUCTS
DUCWET	07	DUCT WEIGHT EVALUATION PER NACELLE OR AIR VEHICLE
FRMELD	07	UNIT PRESSURE RING LOAD EVALUATION
FRMND3	07	FRAME NODE COORDINATES(61 NODES) EVALUATION
MATLF1	07	MATERIAL PROPERTY CURVE FIT
MATLP2	07	MATERIAL PROPERTY DATA PRINT
MCNTL1	07	DEVELOP MATERIAL PROPERTIES FROM LIBRARY DATA
MISCOM	07	WEIGHTS OF ENG.MOUNTS, MISC.DOORS,ETC. APPLY K-FACTOR
NACELE	07	NACELLE SHELL WEIGHT
NCLGEO	07	DEVELOP NACELLE GEOMETRY
PRECRT	07	DETERMINE CRITICAL RAMP DESIGN CRITERIA
PYLONS	07	PYLON AND FITTING WEIGHT
RAMPS	07	RAMP PROPERTIES FOR 2 TO 4 RAMPS PER INLET.
SPAL	07	SETUP TEMP. AND PRESS. FOR 9 PT. SPEED PROFILE.
SPIKE	07	WEIGHT FOR SPIKES BY STATISTICAL EQUATIONS
SUMARY	07	SUMMARIZE AIS WEIGHTS AND C.G.S AND PRINT
TEMPR	07	TEMP/PRESSURE EVAL PROGRAM AT GIVEN GEOPOTENTIAL ALT

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	- • - • - DESCRIPTION - • - • - • - • - • - • - • - • -
OLAY8	08	PROGRAM FOR FIRST OVERLAY OF WING-EMPENNAGE MODULE
ABOXC	08	TORQUE-BOX CROSS-SECTIONAL AREA INTEGRATION
CAERO	08	TRAPEZOIDAL/TOTAL PLANFORM CHORD EVALUATION
CASE	08	GENERAL DATA INITIALIZATION AND CONTROL
CCNTL	08	INITALIZATION - DATA TRANSFER FROM GENERAL DATA
DMAX	08	AIRFOIL DEPTH EVALUATION
GCOMP	08	WING,H,V GEOMETRY DATA PROCESSING FOR OUTPUT
GEOMC	08	GENERAL PLANFORM GEOMETRY AND T/C DATA SETUP
GEOMW	08	WING,H,V GEOMETRY EVALUATION AND CONTROL
PRTG	08	WING,H,V GEOMETRY DATA PRINT
SWPXYP	08	EVALUATION OF X,Y COORD. OF ROTATED POINT
TBWDC	08	TORQUE-BOX SECTION GEOMETRY EVALUATION
VSGEOM	08	ROTATED SURFACE PLANFORM GEOMETRY EVALUATION
OLAY14	14	PROGRAM FOR SECOND OVERLAY OF WING-EMPENNAGE MODULE
CTOT1	14	PLANFORM CHORD EVALUATION
GCNTL	14	TORQUE-BOX, LE, TE GEOMETRY DATA SETUP FOR WT ANALYSIS
LETEI	14	LE/TE WEIGHT INTEGRATION
LEWT	14	LE WEIGHT AND DISTRIBUTION EVALUATION
TEDEV	14	TRAILING EDGE DEVICE WEIGHT ESTIMATION
TEWT	14	TE WEIGHT/DISTRIBUTION EVALUATION AND CONTROL
TEWTI	14	TE DEVICE WEIGHT/DISTRIBUTION EVALUATION
WLETE	14	LEADING EDGE - TRAILING EDGE WEIGHT ESTIMATION CONTROL
OLAY15	15	PROGRAM FOR THIRD OVERLAY OF WING-EMPENNAGE MODULE
CDL	15	EXTERNAL CONCENTRATED DEADWEIGHT EVALUATION
CTOT2	15	PLANFORM CHORD EVALUATION
FDIS	15	FUEL WEIGHT/DIST AND INITIAL T-BOX WT. EVALUATION
MISCIT	15	MISC CONTENT WEIGHT INTEGRATION
MISCNT	15	MISC CONTENT WEIGHT/DISTRIBUTION EVAL/CONTROL
PRTM	15	DESIGN DATA PRINT - MISC. CONTENT MASS DATA
TBFWI1	15	FUEL/TORQUE-BOX WEIGHT INTEGRATION
WCONT	15	CONTROL FOR WEIGHT ESTIMATION OF CONTENTS

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	DESCRIPTION
OLAY16	16	PROGRAM FOR FOURTH OVERLAY OF WING-EMPENNAGE MODULE
ABDW	16	INITIAL STRUCTURE AND CONTENT INERTIA LOAD SETUP
ALOAD	16	DESIGN AIRLOAD PROCESSING
CNSTC	16	STRUCTURAL SYNTHESIS CONSTANTS AND DATA SETUP
GJCAL	16	FLUTTER GJ REQD CONTROL AND EVALUATION
GJSI	16	FLUTTER GJ REQD CALCULATION AT STATION I
GJTT	16	FLUTTER GJ REQUIRED FOR T TAILS
MTLCW	16	MATERIAL PROPERTY PROCESSING CONTROL
MTLFW	16	MATERIAL PROPERTY CURVE FIT
MTLPW	16	MATERIAL PROPERTY DATA PRINT
SS2	16	STRESS-STRAIN CURVE EVALUATION AT GIVEN STRESS
VLOAD1	16	ULTIMATE NET DESIGN LOADS PROCESSING
WDDATA	16	DESIGN DATA GENERATION CONTROL
YBSET	16	EFFECTIVE BOX DEPTH INITIALIZATION
OLAY9	09	PROGRAM FOR FIFTH OVERLAY OF WING-EMPENNAGE MODULE
CSECW	09	CENTER-SECTION WEIGHT EVALUATION
DEADW	09	CURRENT TORQUE-BOX INERTIA LOAD EVALUATION
DLPVT	09	EVALUATION OF BOX STRUCTURE REPLACED BY PIVOT
DWYBA	09	DEADWEIGHT/COUPLE ARM ADJUSTMENT FOR PASS I+1
PIVOT	09	WING PIVOT SYNTHESIS AND WEIGHT EVALUATION
PROG	09	TOTAL SURFACE WEIGHT SYNTHESIS CONTROL
PRTA	09	DESIGN DATA PRINT-TYPE A TORQUE-BOX SYNTHESIS SUMMARY
PRTH	09	DESIGN DATA PRINT-TYPE H C-SEC/PIVOT DESIGN SUMMARY
TBOPT	09	TOTAL TORQUE-BOX WEIGHT OPTIMIZATION CONTROL
TEE	09	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEL	09	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
VLOAD	09	ULTIMATE NET DESIGN LOADS PROCESSING

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	DESCRIPTION
OLAY10	10	PROGRAM FOR SIXTH OVERLAY OF WING-EMPENNAGE MODULE
BHDJT	10	BULKHEAD AND JOINT WEIGHT EVALUATION
BOT	10	INTERPOLATION/EVALUATION FOR FC OR B/T
BOTC	10	PLATE BUCKLING B/T EVALUATION
CG3P	10	PARABOLIC CURVE FIT AND EVALUATION
CNSTR	10	TORQUE-BOX SYNTHESIS/WEIGHT ANALYSIS CONTROL
EIGJC	10	SECTION EI AND GJ STIFFNESS EVALUATION
PRTB	10	DESIGN DATA PRINT-TYPE B SECTION DESIGN DETAIL SUMMARY
PRTBK	10	DESIGN DATA PRINT-DETAIL SYNTHESIS SEARCH DATA
PRTC	10	DESIGN DATA PRINT-TYPE C SECTION DESIGN DETAIL SUMMARY
RTRIB	10	ROOT RIB AND SHEAR TIE WEIGHT EVALUATION
SECTD	10	TORQUE-BOX SECTION SYNTHESIS-SEARCH LEVEL 1 CONTROL
SFSCH	10	SEARCH LEVEL 2 CONTROL--DESIGN STRESS
SKWEB	10	SPAR WEB CRITICAL STRESS EVALUATION
SRRIB	10	RIB T-WEB EVALUATION
SS	10	STRESS-STRAIN CURVE EVALUATION AT GIVEN STRESS
STBAR	10	TOTAL COVER/SUPT STRUCTURE T-BAR EVALUATION
STRG	10	STRINGER/CAP OPT MATL DIST/GEOMTRY EVALUATION
STRGO	10	STRINGER/CAP GEOMETRY/BOUNDARY INITIALIZATION
STRIB	10	RIB T-BAR SYNTHESIS AND CONTROL
STRIL	10	STRINGER COLUMN LENGTH EVALUATION
STWEB	10	FRONT/REAR SPAR CAP/WEB EVALUATION AND CONTROL
TSCH	10	SEARCH LEVEL 3 CONTROL--OPTIMUM T(SKIN)/A(STR.CAP)
VFCAL	10	SECTION TORSIONAL STIFFNESS REQMT EVALUATION
WTCAL	10	SECTION/PANEL WEIGHT EVALUATION AND CONTROL
WTPIN	10	SECTION WEIGHT/INCH EVALUATION
OLAY17	17	PROGRAM FOR SEVENTH OVERLAY OF WING-EMPENNAGE MODULE
CTOT	17	PLANFORM CHORD EVALUATION
PINTO	17	MASS/DESIGN DATA PUNCH/PRINT FOR FLUT. OPT. PROGRAM
PRTD	17	WING.H.V WEIGHT SUMMARY PRINT
TBFWI	17	FUEL/TORQUE-BOX WEIGHT INTEGRATION
TPINT	17	PARABOLIC CURVE FIT AND EVALUATION
WFLDD	17	MASS/DESIGN DATA CALC/OUTPUT FOR FLEX LOADS PROGRAM
WODATA	17	WING.H.V ANALYSIS OUTPUT DATA CONTROL
WVFDD	17	MASS/DESIGN DATA CALC. FOR FLUTTER OPT. PROGRAM

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	- . - . - DESCRIPTION - . - . - . - . - . - . - . -
OLAY18	18	PROGRAM FOR EIGHTH OVERLAY OF WING-EMPENNAGE MODULE
ACEIGJ	18	TORQUE-BOX EI/GJ EVALUATION - ADV. COMP. ANALYSIS
ACLOAD	18	DESIGN LOAD DATA PROCESS - ADV. COMP. ANALYSIS
ACMRSK	18	SKIN-STR LOAD DIST. SKIN STABILITY -ADV.COMP.ANALYSIS
ACNSTR	18	SECTION DESIGN DATA/WT ANALYSIS CONTROL - ADV. COMP.
ACPROG	18	TOTAL SURFACE WEIGHT SYNTHESIS CONTROL - ADV. COMP.
ACPRTA	18	DESIGN DATA PRINT-TYPE A TORQUE-BOX SYNTHESIS SUMMARY
ACSTRG	18	STRINGER GEOMETRY/SECTION PROPERTIES-ADV.COMP.ANALYSIS
ACWFDH	18	FULL DEPTH HC SECTION OPTIMIZATION - ADV.COMP.ANALYSIS
ACWMS	18	M/SPAR. FDH TORQUE-BOX SYNTHESIS - ADV.COMP.ANALYSIS
ACWRBS	18	M/RIB TORQUE-BOX SYNTHESIS - ADV. COMP. ANALYSIS
ACWSTR	18	SKIN-STR/RIB SECTION OPTIMIZATION - ADV.COMP.ANALYSIS
ASTIFF	18	TORQUE-BOXSTIFFNESS EVALUATION - ADV.COMP.ANALYSIS
ATBOPT	18	ADV. COMP. TORQUE-BOX SYNTHESIS CONTROL
AVLOAD	18	NET ULT. LOADS CALC. - ADV. COMP. ANALYSIS
BHDJT	18	BULKHEAD AND JOINT WEIGHT EVALUATION
CKSFDH	18	STABILITY CHECK FOR FULL DEPTH HC CORE -ADV.COMP.SKINS
CKSTAB	18	COMP/SHEAR STABILITY CHECK FOR ADV. COMP. PANELS
CSECW	18	CENTER-SECTION WEIGHT EVALUATION
DEADW	18	CURRENT TORQUE-BOX INERTIA LOAD EVALUATION
DLPVT	18	EVALUATION OF BOX STRUCTURE REPLACED BY PIVOT
DWYBA	18	DEADWEIGHT/COUPLE ARM ADJUSTMENT FOR PASS I+1
PIVOT	18	WING PIVOT SYNTHESIS AND WEIGHT EVALUATION
PRTB	18	DESIGN DATA PRINT-TYPE B SECTION DESIGN DETAIL SUMMARY
PRTC	18	DESIGN DATA PRINT-TYPE C SECTION DESIGN DETAIL SUMMARY
PRTH	18	DESIGN DATA PRINT-TYPE H C-SEC/PIVOT DESIGN SUMMARY
RTRIB	18	ROOT RIB AND SHEAR TIE WEIGHT EVALUATION
TEE	18	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEL	18	PIVOT DESIGN/SYNTHESIS DATA EVALUATION
TEMPC	18	MATERIAL PROPERTIES EVAL FOR ADV. COMP. ANALYSIS
WEIGH1	18	SECTION WT/INCH FOR ADV. COMP M/SPAR. FDH TORQUE-BOX
WEIGH2	18	SECTION WT/INCH FOR ADV. COMP. M/RIB TORQUE-BOX
WTCAL	18	SECTION/PANEL WEIGHT EVALUATION AND CONTROL
WTPIN	18	SECTION WEIGHT/INCH EVALUATION
XN	18	EVALUATION OF NO. OF N-PLIES FOR GIVEN L.M PLIES

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONT)

DECK NAME	OLAY	DESCRIPTION
FUSO1	11	PROGRAM FOR FIRST FUSELAGE OVERLAY
DUMMY1	11	CHECK COMPATIBILITY OF DATA AND FORCE STAT.OR DYN.BAL.
FARLD	11	DISTRIBUTE LIFT LOADS OF FUS. NOSE AND WING CARRYOVER
FFRME	11	MAJOR FRAME SYNTHESIS CONTROL.
FLDDT	11	SETUP EXTERNAL LOADS BY CONDITION TYPE
FLDIN	11	REORDER INPUT NET LOADS.
FLDNT	11	CALC. NET FUSELAGE SHEAR AND MOMENT DIAGRAMS
FRMEG	11	LOCATE EXTERNAL SUPPORT POINTS FOR WING.TAILS.L.G.,ETC
FRMLD	11	ELASTIC CENTER APPROACH TO INTERNAL RING LOADS
FRMND1	11	DEVELOP FRAME NODES FOR ROUNDED RECTANGULAR GEOMETRY
FRMND2	11	DUMMY - POTENTIAL FOR FRAME NODES FOR ELLIPTICAL GEOM.
FUSLD	11	FUSELAGE LOADS CONTROL
GEOMF1	11	FUSELAGE EXTERNAL SHELL GEOMETRY FOR ROUNDED RECTANGLE
GEOMF2	11	DUMMY - POTENTIAL FOR ELLIPTICAL SHAPES FOR SHELL GEOM
INERT1	11	UNIT PITCH, ROLL, YAW INERTIAS FOR ROUNDED RECTANGLES
INERT2	11	DUMMY - POTENTIAL USE FOR ELLIPTICAL UNIT INERTIAS
MATLF	11	INTERPOLATION FOR DESIRED TEMPERATURE ON MATERIAL DATA
MATLP1	11	MATERIAL PRINT - FUSELAGE COVER,LONGERONS,FRAMES
MFCNTL	11	DEVELOP MATERIAL PROPERTIES FROM LIBRARY DATA
QCRIT	11	DETERMINE CRITICAL DYNAMIC PRESSURE FOR PANEL FLUTTER
SFOAWE	11	FRAME SYNTHS. FOR COMPOSITE INTERN.LOADS AND MATERIAL

TABLE 2. DESCRIPTIVE LIST OF SWEEP ROUTINES (CONCL)

DECK NAME	OLAY	- . - . - DESCRIPTION - . - . - . - . - . - . - . -
FUSU2	12	PROGRAM FOR SECOND FUSELAGE OVERLAY
BLKHDS	12	LOCATE BULKHEADS - GEOM., WEIGHT, PRESSURE LOADING
CUTOUT	12	DEVELOP PANEL NET EFFECTIVENESS DUE TO CUTOUTS
CVPRES	12	COVER SYNTHESIS, PRESSURE FOR CABIN,FUEL OR COMPARTM.
DBLKHD	12	BULKHEAD SYNTHESIS
FBEND	12	LONGERON-STRINGER,BENDING,FORCED CRIPPLING,STIFFNESS
FCOVER	12	COVER SYNTHESIS, STRENGTH, FLUTTER, ACOUSTICS
FHCMB	12	DUMMY - POTENTIAL FOR HONEYCOMB
FPANEL	12	CONTROL FOR FRAME SPACING SEARCH
FUSSHL	12	SHELL SYNTHESIS CONTROL
FWEIGH	12	WEIGHT OF COVERS, LONGERONS AND MINOR FRAMES
GJ1GEO	12	SECTION TORQUE GEOMETRY DUE TO CUTOUTS,DECKS,SHROUDS
GJ2GEO	12	DUMMY - POTENTIAL FOR ELLIPTICAL GJ1GEO
I1LONG	12	SECTION PROPERTIES FOR COVER,LONGERON /UNIT THICK,AREA
I2LONG	12	DUMMY - POTENTIAL FOR ELLIPTICAL I1LONG
LOCHK	12	SELECT CRITICAL DESIGN LOADS FOR SECTION SYNTHESIS
LONGS	12	CONTROL FOR STRINGER SEARCH AND LONGERON LOCATION
MINFR	12	MINOR FRAMES - GENERAL STABILITY,FORCED CRIPPL,ACOUST.
MINMUM	12	OPTIMIZE BULKHEAD STIFFENER SPACING
MISCWT	12	MISC. WEIGHTS - FITTINGS, ENGINE DRAG BEAM, EJEC.FRAME
PARTIT	12	PARTITIONS - STATISTICAL WEIGHT ESTIMATE
SECOST	12	WEIGHT OF SECONDARY STRUCTURE
SPRINT	12	FUSELAGE PRINT
SUMMRY	12	SUMMARIZE WEIGHTS AND DETERMINE C.G.DATA
WTDIST	12	DUMMY - POTENTIAL REDIST. WEIGHT FOR ITERATION
OUTPUT	13	PROGRAM FOR FINAL OUTPUT MODULE (WEIGHT SUMMARY)

PERIPHERAL REQUIREMENTS

SWEEP requirements as a stand-alone computing system consist of four input/output files and one mass storage file, file 1. These files consist of:

1. Mass storage file 1, TAPE1

2. System input file, TAPE5

3. System output file, TAPE6

4. Permanent data file, TAPE7

5. Common storage file, TAPE24

In addition to the foregoing files which are used during execution of the program, the method of operating shown in examples in Section III requires one magnetic tape unit. The program and permanent data are maintained on a magnetic tape and are transferred to internal files by the CDC control cards.

Section III

PROGRAM OPERATION

As an integrated engineering program, SWEEP requires three types of external data: (1) an input data set that is used to describe the design problem, (2) a data bank compilation of engineering data from which necessary design information can be drawn, as required, and (3) an input set of program analysis control words. The modules of SWEEP logically interprets the problem design information, converts then into engineering data, and orders the results properly for all the evaluation routines. Mass storage files are used to transmit design information from design data modules to the weight analysis modules which perform the necessary structural synthesis/weight analysis so that the primary result is a set of weight estimates for the major structural components.

INPUT ARRANGEMENT

Figure 3 shows a typical input card deck setup for a SWEEP run. This arrangement assumes that all SWEEP routines are stored in object form as the first file of a tape by the use of the COPYLIB operation. Also, that the second file of that tape is the permanent data stored in card image format. Figure 4 shows the sequential order of the data bank data deck. This set is used to create the permanent data file and, subsequently, TAPE7.

PERMANENT DATA BANK DECK

The permanent data bank deck, Figure 4, consists of the following:

1. Aerodynamic data for loads
2. Spectrum data for fatigue
3. Weight analysis constants and index factors
4. Flutter and temperature constants
5. Weight constants and data for initial weight distribution
6. Airfoil description
7. Material property descriptions

Records in this data bank are used to initialize mass storage file design data records for use by the different program modules.

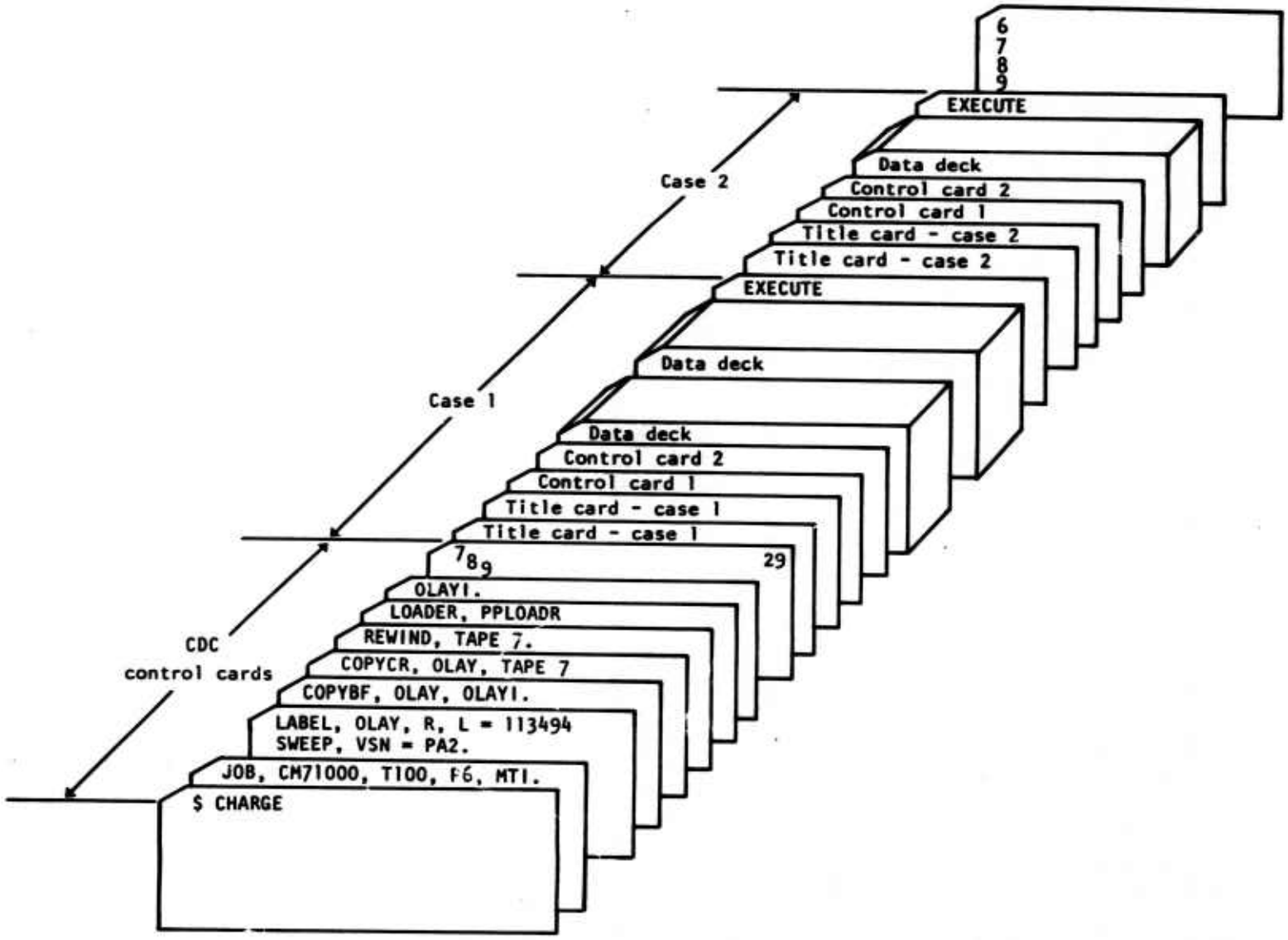


Figure 3. SWEEP program sample input data deck arrangement.

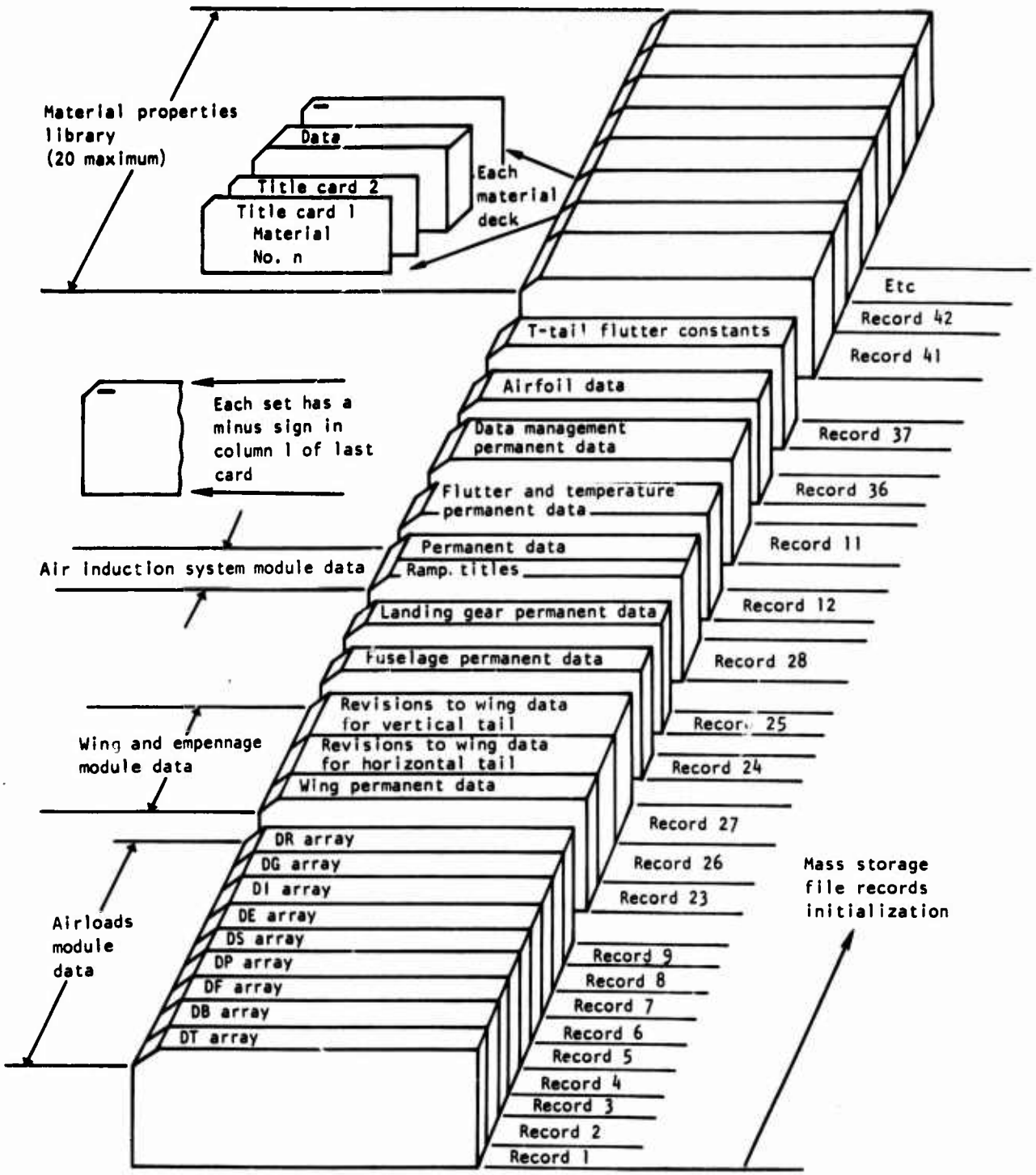


Figure 4. SWEEP permanent data bank data deck setup and mass storage file initialization.

CASE DATA CARD DECK

The first two cards in the input data deck for each case are title cards. 80 alphanumeric characters may be written on each card.

Control card 1 follows the two title cards. This card contains the optional output print indicators. These indicators are shown in Table 3.

Control card 2 follows control card 1. This card contains the airloads module indicators in columns 1 through 38, wing and empennage construction indicators in columns 39 through 44, program flow controls in columns 71 through 79, and an initialization indicator in column 80. Descriptions of these controls and indicators are shown in Table 4.

Data decks follow control card 2. The first card in each data deck must contain one of the identification titles shown in the following in columns 1 through 10. Columns 11 through 80 are not read by the program, and therefore may be used for deck identification or comments by the program user.

1 2 3 4 5 6 7 8 9 10
G E N E R A L
W I N G
H O R I Z O N T A L
V E R T I C A L
F U S E L A G E
L G
A I S
F A T I G U E
W H V L O A D S
F U S L O A D S
I N E R T I A

The remaining cards contain numeric data which are read and processed based on a relative address for the field data on each card (Figure 5). The last card of each data deck has a minus sign (-) punched in card column 1. Usage matrix of these data checks is shown in Table 5. Detail discussions of variables in these decks are presented in Volume IX, Users' Manual.

The last card in the case data deck has "EXECUTE" punched in columns 1 through 7. Columns 8 through 10 on this card must be left blank.

TABLE 3. CASE CONTROL CARD 1 - PRINT INDICATORS

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
1	READ	(1,0)	Permanent data, first case only
2	READ	(1,0)	Case data
3	CCNTL	(8,0)	WD array, some of D-array before data transfer, total D-array, SPAL array (record 38)
4	GEOMC	(8,0)	YC, YTC, and TAF arrays
5	DMAX	(8,0)	Values from YTC, YC, and TAF arrays
	ABOXC	(8,0)	Values from YTC and TT arrays
	TBWDC	(8,0)	Title for DMAX print
6	PRTG(GEOMW)	(8,0)	Detail geometry
7	GEOMW	(8,0)	TGJ array
	PRTG	(8,0)	TXY array - only when IP(6) also = 0
	VSGEOM	(8,0)	TVS array
8	CTOT1	(14,0)	TT(1), TT(2), and YC array
	GCNTL	(14,0)	Title for CTOT1 print
	LEWT	(14,0)	Title for CTOT1 print
	TEDEV	(14,0)	Title for CTOT1 print
	TEWT	(14,0)	Title for CTOT1 print
	TEWTI	(14,0)	Title for CTOT1 print
9	GCNTL	(14,0)	TG and TGA arrays
10	LETEI	(14,0)	TCS, TWG, CLEI, and CTEI arrays
11	LEWT	(14,0)	TGR, TST, CCI, CCL, and CCW arrays
	TEWT	(14,0)	CCW, CCT, and TE arrays
	TEWTI	(14,0)	TGR, TST and CCI arrays
12	WLETE	(14,0)	Leading and trail edge weight and loads summary
13	MISCNT	(15,0)	Detail - CCI, TST, and TGR arrays
	PRTM(MISCIT)	(15,0)	Detail - CCI, TST, TGR, and TCS arrays
14	MISCNT	(15,0)	Summary - CMII and TMVT arrays
	PRTM(MISCIT)	(15,0)	Summary - TCS and CCI arrays

TABLE 3. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
15	CTOT2	(15,0)	TT(1), TT(2), and YC array
	MISCNT	(15,0)	Title for CTOT2 print
	MISCIT	(15,0)	Title for CTOT2 print
	CDL	(15,0)	Title for CTOT2 print
	FDIS	(15,0)	Title for CTOT2 print
16	CDL	(15,0)	TGR and TCS arrays
	TBFWI1	(15,0)	CCI and TCS arrays
17	FDIS	(15,0)	CCI, TST, TCS, TWG, and TVMT arrays
18	FDIS	(15.0)	Fuel distribution summary
19	MTLPW(MTLCW)	(16,0)	Torque box and pivot material properties
	TEMPC	(18,0)	Material properties for advanced composites
20	ALOAD	(16,0)	Limit airloads and scaling ratios
	ACLOAD	(18,0)	ACL array
21	ABDW	(16,0)	Initial deadweight distribution
22	GJCAL	(16,0)	Flutter analysis values, GJ and J comparison Design GJ values
	GJTT	(16,0)	T-tail GJ values
23	WDDATA	(16,0)	T and CD arrays
24	VLOAD1	(16,0)	Initial design loads, required GJ
	DEADW	(9,0)	Deadweight summary and adjustment results, for NODW > 1
	DWYBA	(9,0)	Deadweight and Y-bar adjustment values, for NODW > 1
	VLOAD	(9,0)	Design loads and required GJ, for NODW > 1
	DEADW	(18,0)	Deadweight summary and adjustment results, for NODW > 1
	DWYBA	(18,0)	Deadweight and Y-bar adjustment values, for NODW > 1
	AVLOAD	(18,0)	Design loads, required GJ, loads at each condition

TABLE 3. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
25	DEADW	(9,0)	Deadweight summary and adjustment results, for NODW=1
	DWYBA	(9,0)	Deadweight and Y-bar adjustment values, for NODW=1
	VLOAD	(9,0)	Design loads and required GJ, for NODW=1
	DEADW	(18,0)	Deadweight summary and adjustment results, for NODW=1
	DWYBA	(18,0)	Deadweight and Y-bar adjustment values, for NODW=1
	AVLOAD	(18,0)	Design loads, required GJ, loads at each condition, for NODW=1
26	DLPVT	(9,0)	TW array
	PIVOT	(9,0)	Pivot values
	DLPVT	(18,0)	TW array
	PIVOT	(18,0)	Pivot values
27	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=2
	ACPRTA (ATBOPT)	(18,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=2
28	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=1,3
	ACPRTA (ATBOPT)	18,0)	Design synthesis and weight distribution summary, for NODW >1 and DGW=1,3
29	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW=1 and DGW=2
	PRTH(TBOPT)	(9,0)	Pivot and center section analysis values, for NODW=1 and DGW=2
	ACPRTA (ATBOPT)	(18,0)	Design synthesis and weight distribution summary for NODW=1 and DGW=1,2,3
	PRTH(ATBOPT)	(18,0)	Pivot and center section analysis values, for NODW=1 and DGW=1,2,3
30	PRTA(TBOPT)	(9,0)	Design synthesis and weight distribution summary, for NODW=1 and DGW=1,3
	PRTH(TBOPT)	(9,0)	Pivot and center section analysis values, for NODW=1 and DGW=1,3

TABLE 3. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
31	PRTB(CNSTR)	(10,0)	Synthesis details, for DGW=2
	PRTC(CNSTR)	(10,0)	Weight analysis details, for DGW=2
	PRTB(ACNSTR)	(18,0)	Synthesis details, for DGW=2
	PRTC(ACNSTR)	(18,0)	Weight analysis details, for DGW=2
	ACNSTR	(18,0)	DDUC, DDLC, DDIS, DDFS, DDRS, and DDSTR arrays, for DGW=2
	ASTIFF	(18,0)	CD array, for DGW=2
32	PRTB(CNSTR)	(10,0)	Synthesis details, for DGW=1,3
	PRTC(CNSTR)	(10,0)	Weight analysis details, for DGW=1,3
	PRTB(ACNSTR)	(18,0)	Synthesis details, for DGW=1,3
	PRTC(ACNSTR)	(18,0)	Weight analysis details, for DGW=1,3
	ACNSTR	(18,0)	DDUC, DDLC, DDIS, DDFS, DDRS, and DDSTR arrays, for DGW=1,3
	ASTIFF	(18,0)	CD array, for DGW=1,3
33	PRTBK(STRG)	(10,0)	Checkout print, requires data indicators
	PRTBK(TSCH)	(10,0)	Checkout print, requires data indicators
34	WVFDD	(17,0)	TCS and CCDLI arrays
	TBFWI	(17,0)	TCS and CCI arrays
35	CTOT	(17,0)	TT(1), TT(2), and YC array
	WVFDD	(17,0)	Title for CTOT print
	WFLDD	(17,0)	Title for CTOT print
36	WODATA	(17,0)	Surface inertia summary
37	PRTD	(17,0)	Detail weight and coefficient summaries
38	WODATA	(17,0)	WCG, CTBW, CTBI, CLEI, CTEI, CMII, CFL1I, CFL2I, CCDLI, CIOY, and CCI arrays
39	not used		
40	OLAY00	(0,0)	Case title and module identification
41	WHVMAT	(3,0)	Stress vs temperature tables
	WHVQQ	(3,0)	Compressible dynamics pressure values
	SVFTAB	(3,0)	Flutter parameter vs mach number
42	SPDALT	(2,0)	Speed-altitude profile tables
43	DSGNPR	(2,0)	Speed profile design factors

TABLE 3. CASE CONTROL CARD 1 - PRINT INDICATORS (CONT)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
44	QUIKIE	(2,0)	S-array
45	AVDINR	(2,0)	RT, RW, RH, RV, RA, and RO arrays
46	PRTOWE (DATAIN)	(2,0)	Weight empty breakdown, expendable useful load
47	DATAIN	(2,0)	BC array
	DMAXLD	(2,0)	Estimated shear, bending moment, and torque
	DCCNTL	(2,0)	WD array
48	AVDATA	(2,0)	S-array
49	DATAIN	(2,0)	Common at end of Data Management
50	BNLDS	(4,0)	Body loads
51	SPABM	(4,0)	Shear, bending moment, and torsion moment
52	USPAN	(4,0)	Airload distribution factors
53	WHVNET	(4,0)	Design loads and ratios
54	BLCNTL	(4,0)	Temperature and stress for 23 load conditions, design temperature and load conditions, maximum net bending moments for fatigue
55	FATMG	(4,0)	Fatigue spectra
56	FATGUE	(5,0)	Bending moment spectra input
57	FATIGU	(5,0)	Damage table, calc life, etc
	FTGCTL	(5,0)	"FATIGUE " input values
58	FATIGU	(5,0)	Intermediate values, iteration trace
59	LANDGR	(6,0)	Landing gear input data
60	LGEAR	(6,0)	Landing gear loads
61	AISMN	(7,0)	AIS system input data
62	SPAL	(7,0)	Speed-altitude profile tables
63	MATLP2 (MCNTL1)	(7,0)	Duct, ramp and nacelle material properties

TABLE 3. CASE CONTROL CARD 1 - PRINT INDICATORS (CONCL)

Control Card 1 Column (IP loc)	Routine[a]	Overlay	Description
64	MCNTL1	(7,0)	TMS array
65	DSGNP	(7,0)	Speed profile design factors
66	PRECRT	(7,0)	Ramp design conditions
67	RAMPS	(7,0)	Built-in parameters, reaction forces and weights
68	FRMELD	(7,0)	Duct frame data
69	DUCTS	(7,0)	Duct frame data and duct geometry - section data
70	NACELE	(7,0)	Nacelle geometry - section data
71	FUSLD	(11,0)	Fuselage loads and inertia data
72	MATLP1 (MFCNTL)	(11,0)	Cover, longeron, major and minor frames material properties
73	MFCNTL	(11,0)	TMS array
74	FUSLD DUMMY1	(11,0) (11,0)	Loads array Input and corrected data
75	FFRME FRMND1	(11,0) (11,0)	External frame loads details Fuselage shape details
76	SFOAWE FRMLD	(11,0) (11,0)	Frame synthesis details Segment loads details
77	FFRME	(11,0)	Major frames detail weights
78	MINFR	(12,0)	T-array
79	FUSSHL	(12,0)	T-array
80	SPRINT	(12,0)	Details - Construction indicators, basic vehicle data, secondary structure, shell and section values

[a]Routine in which the corresponding IP element is tested and printing is done. If a second routine name appears in parenthesis as PRTG(GEOMW), this indicates that PRTG is strictly a print routine and the indicator is used in GEOMW to call or not call PRTG.

TABLE 4. CASE CONTROL CARD 2 INDICATORS

Control Card 2 Column	Labeled Common Location	Description
1-2	XMISC(51)	Air vehicle class indicator 01 = fighter (F) 02 = attack (A) 03 = tactical bomber (BI) 04 = strategic bomber (BII) 05 = cargo assault (CA) 06 = cargo transport (CT)
3-4	XMISC(52)	Wing-type indicator -1 = fixed wing 01 = variable-sweep wing
5-6	XMISC(53)	Vertical tail-type indicator -1 = single tail 00 = dual tail 01 = T-type tail
7-8	XMISC(54)	Load calculation option indicator -1 = calculate basic loads only 00 = calculate fatigue spectra only 01 = calculate both basic loads and fatigue spectra
9-10	XMISC(55)	Total vehicle load calculation control 01 = compute all loads (fuselage, wing, horizontal tail, vertical tail) 00 = compute loads as indicated by controls in columns 11 through 18
11-12	XMISC(56)	Fuselage load calculation indicator 01 = compute 00 = do not compute
13-14	XMISC(57)	Wing load calculation indicator 01 = compute 00 = do not compute
15-16	XMISC(58)	Horizontal tail load calculation indicator 01 = compute 00 = do not compute

TABLE 4. CASE CONTROL CARD 2 INDICATORS (CONT)

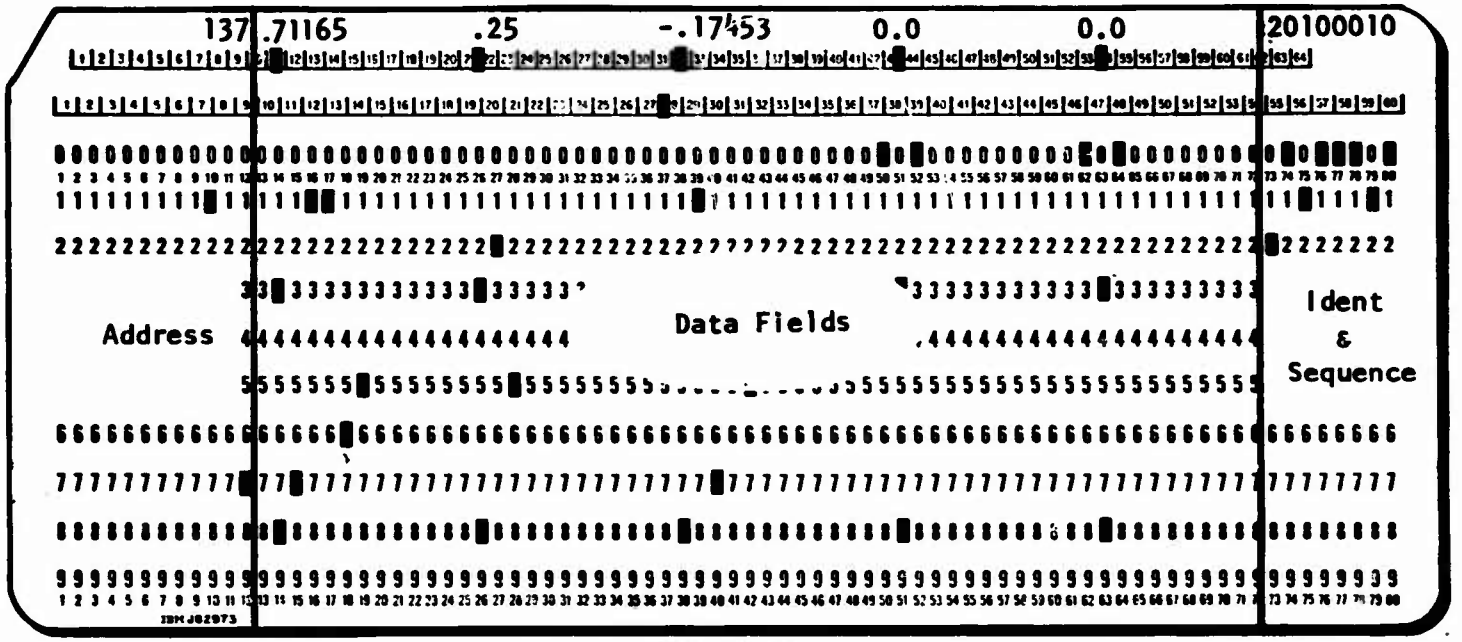
Control Card 2 Column	Labeled Common Location	Description
17-18	XMISC(59)	Vertical tail load calculation indicator 01 = compute 00 = do not compute
19-20	XMISC(60)	Load conditions 1 through 5 calculation indicator (positive maneuver conditions) 01 = compute 00 = do not compute
21-22	XMISC(61)	Load conditions 6 and 7 calculation indicator (negative maneuver conditions) 01 = compute 00 = do not compute
23-24	XMISC(62)	Load condition 8 calculation indicator (flaps down, maneuver condition) 01 = compute 00 = do not compute
25-26	XMISC(63)	Load condition 9 calculation indicator (flaps down, landing) 01 = compute 00 = do not compute
27-28	XMISC(64)	Load conditions 10 through 13 calculation indicator (positive vertical gust conditions) 01 = compute 00 = do not compute
29-30	XMISC(65)	Load conditions 14 through 17 calculation indicator (negative vertical gust conditions) 01 = compute 00 = do not compute
31-32	XMISC(66)	Load conditions 18 and 19 calculation indicator (lateral gust conditions) 01 = compute 00 = do not compute

TABLE 4. CASE CONTROL CARD 2 INDICATORS (CONT)

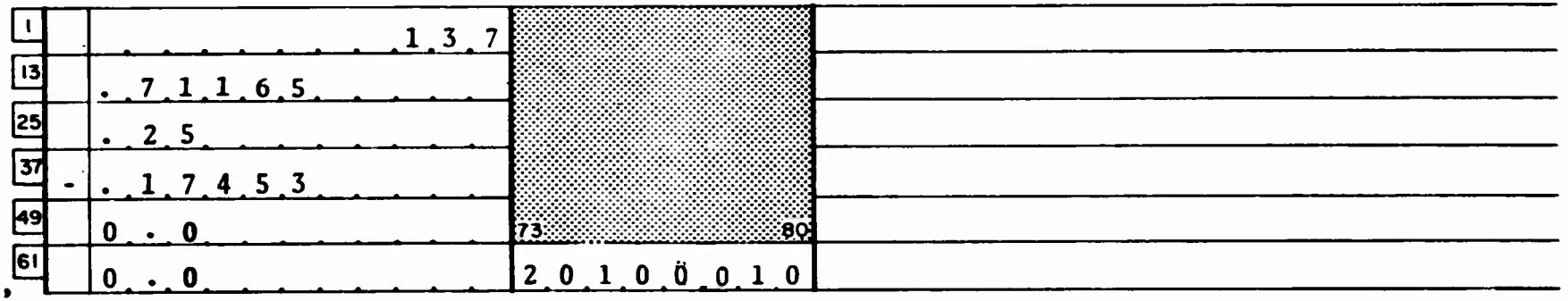
Control Card 2 Column	Labeled Common Location	Description
33-34	XMISC(67)	Load conditions 20 and 21 calculation indicator (pitching acceleration conditions) 01 = compute 00 = do not compute
35-36	XMISC(68)	Load conditions 21 and 23 calculation indicator (yawing acceleration conditions) 01 = compute 00 = do not compute
37-38	XMISC(69)	Wing fatigue spectra calculation indicator -1 = compute gust and maneuver spectra 01 = compute gust spectra only
39-40	IFL(11)	Wing construction indicator 00 = metal structure 01 = advanced composite structure
41-42	IFL(12)	Horizontal tail construction indicator 00 = metal structure 01 = advanced composite structure
43-44	IFL(13)	Vertical tail construction indicator 00 = metal structure 01 = advanced composite structure
45-70		Not used
71	IFL(1)	Airloads module execution control 0 = execute 1 = do not execute
72	IFL(2)	Wing execution control for wing and empennage module 0 = execute 1 = do not execute
73	IFL(3)	Fuselage module execution control 0 = execute 1 = do not execute

TABLE 4. CASE CONTROL CARD 2 INDICATORS (CONCL)

Control Card 2 Column	Labeled Common Location	Description
74	IFL(4)	Landing gear module execution control 0 = execute 1 = do not execute
75	IFL(5)	Horizontal tail execution control for wing and empennage module 0 = execute 1 = do not execute
76	IFL(6)	Vertical tail execution control for wing and empennage module 0 = execute 1 = do not execute
77	IFL(7)	Air induction system module execution control 0 = execute 1 = do not execute
78	IFL(8)	Fatigue module execution control 0 = execute 1 = do not execute
79	IFL(9)	Final output module execution control 0 = execute 1 = do not execute
80	IFL(10)	File initialization control for subsequent cases (not applicable for first case) 0 = leave files as they exist and update with input data 1 = reinitialize data files (mass storage file records 1-9, 11, 12, 17, 21, 23-29, 32-34, 36-38, and 41-60) from TAPE7



Data Card



Data Sheet

Figure 5. Relative read data card format.

TABLE 5. USAGE MATRIX OF INPUT DATA DECKS

Data Deck Title	Mass Storage File Record	Module	Component	Description
GENERAL	11	Data management	Vehicle	Vehicle geometry and design data
	24[a]	Fuselage	Fuselage	Fuselage geometry
	28[a]	Air induction system	Nacelles, ducts, and engine section	Nacelle, ducts, and engine section design data
	5	Airloads	Vehicle	Blocked mission segments
WING	23	Wing and empennage	Wing	Wing design data
HORIZONTAL	26	Wing and empennage	Horizontal tail	Horizontal tail design data
VERTICAL	27	Wing and empennage	Vertical tail	Vertical tail design data
FUSELAGE	24[a]	Fuselage	Fuselage	Fuselage design data
LG	25	Landing gear	Landing Gear	Landing gear design data
AIS	28[a]	Air induction system	Nacelles, ducts, and engine section	Nacelle, ducts, and engine section design data
FATIGUE	29	Fatigue	Wing and fuselage	Fatigue design data
	35	Fatigue	Wing	Wing bending moment spectra
WHV LOADS	32	Wing and empennage	Wing, horizontal tail, and vertical tail	Surface loads data

TABLE 5. USAGE MATRIX OF INPUT DATA DECKS (CONCL)

Data Deck Title	Mass Storage File Record	Module	Component	Description
FUS LOADS	33	Fuselage	Fuselage	Vehicle airload, center-of-pressure, and inertia factor data
INERTIA	34	Fuselage	Fuselage	Vehicle and component weight distributions and speed-altitude profile data

[a]Some of the data in the "GENERAL" data deck duplicate data required in the "FUSELAGE" and "AIS" data decks. The values in the "GENERAL" data deck are transfered to the fuselage and AIS data file records whenever the general data are read.

OPERATING CONSIDERATIONS

Problem definition and program controls require coordination between case control card 2 instructions and design data decks. The SWEEP main control program starts by calling the input data processing module. Program execution requirements through the design data development, weight analysis, and output module are shown in Table 6. This table presents minimum and optional execution requirements which can be employed for the range of problem modes.

INITIALIZATION AND COMPUTATION

The SWEEP control program controls the execution of the problem. It occupies the main level of the overlay system and monitors the logic flow through initialization of data, design data development, weight analysis, and output.

INPUT DATA PROCESSING

The input data processing module organizes the data bank data and input variable design data in mass storage file records at the start of each problem case. A complete list of SWEEP mass storage file records is shown in Table 7. Computational flow instructions from case control cards 1 and 2 and certain key variables from the input design data are stored in labeled common locations. Labeled common block IFLOW indicators are shown in Table 8. Program definition and usage of the labeled common block MISC are shown in Table 9.

DESIGN DATA DEVELOPMENT

The design data development modules interpret input vehicle design specifications and geometry data and compute detail design data for use in evaluating the structural components. Modules programmed for design data development are:

1. Data management module, overlay (2,0)

2. Flutter and temperature module, overlay (3,0)

3. Airloads module, overlay (4,0)

4. Fatigue module, overlay (5,0)

TABLE 6. LOGIC AND DATA REQUIREMENTS FOR EXECUTION OF SWEEP MODULES

Module	Indicator and Reqd Data Deck		Discussion
	Control Card 2 Column	Data Deck	
Data management	None	GENERAL	Data management and flutter and temperature modules are executed in each case in which "GENERAL" is read
Flutter and temperature	None	GENERAL	This module uses speed-altitude profile and geometry data from the data management module
Airloads	71	GENERAL	This module requires data from the data management module from the same case or a previous case. Detail execution controls are in control card 2 columns 1 through 38.
Fatigue	78	FATIGUE	This module may be executed as a stand-alone program or with spectrum data created by the airloads module.
Landing gear	74	LG	This module may be executed as a stand-alone program or with design data from the data management module.
Air induction system	77	AIS	This module may be executed as a stand-alone program. If "GENERAL" data are part of the input case data, certain variables are transferred to the "AIS" data record.

TABLE 6. LOGIC AND DATA REQUIREMENTS FOR EXECUTION OF SWEEP MODULES (CONCL)

Module	Indicator and Reqd Data Deck		Discussion
	Control Card 2 Column	Data Deck	
Wing and empennage (wing)	39-40, 72	WING	This module may be executed as a stand-alone program. Loads may be defined either in the "WING" deck, the "WHV LOADS" deck, or by the airloads module. Flutter data may be defined in the "WING" deck or obtained from the flutter and temperature module.
Wing and empennage (horizontal tail)	41-42, 75	HORIZONTAL	Refer to wing discussion.
Wing and empennage (vertical tail)	43-44, 76	VERTICAL	Refer to wing discussion
Fuselage	73	FUSELAGE	This module may be executed as a stand-alone program. If "GENERAL" data are part of the input case data, certain variables are transferred to the "FUSELAGE" data record. Inertia and loads data may be obtained through execution of the data management, flutter and temperature, and airloads module or by input of the "INERTIA" and "FUS LOADS" decks.
Final output	79	GENERAL	This module requires data from the data management module from the same case or a previous case

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
1	D(56)	READ	(1,0)	TAPE7	DT(56)	BLCNTL	(4,0)	Permanent file aerodynamic data
2	D(853)	READ	(1,0)	TAPE7	DB(853)	BLCNTL	(4,0)	Permanent file subsonic aero data
3	D(146)	READ	(1,0)	TAPE7	DF(146)	BLCNTL	(4,0)	Permanent file deflected flap data
4	D(734)	READ	(1,0)	TAPE7	DP(734)	BLCNTL	(4,0)	Permanent file supersonic aero data
5	D(288)	READ	(1,0)	TAPE7 and "GENERAL"	D(288) DS(288)	READ FATMG	(1,0) (4,0)	Permanent file or input blocked mission segment tables
6	D(340)	READ	(1,0)	TAPE7	DE(340)	FATMG	(4,0)	Permanent file maneuver load factor spectra
7	D(60)	READ	(1,0)	TAPE7	DI(60)	FATMG	(4,0)	Permanent file taxi load factor spectra
8	D(72)	READ	(1,0)	TAPE7	DG(72)	FATMG	(4,0)	Permanent file turbulence field parameter
9	D(109)	READ	(1,0)	TAPE7	DR(109)	FATMG	(4,0)	Permanent file gust response factors

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
10	TGJ(200)	GEOMW	(8,0)	Calculated	TGJ(200)	GJCAL	(16,0)	Geometry and design data for flutter requirement calculations
11	D(1606)	READ	(1,0)	TAPE7 and "GENERAL"	D(1606) D(1400) D(1400)	READ DATAIN OUTPUT	(1,0) (2,0) (13,0)	Input data set for data management module
12	D(312)	READ	(1,0)	TAPE7	DATA (312)	OLAY3	(3,0)	Permanent file flutter and temperature data
13	CD(400)	ACPROG	(18,0)	Calculated				Calculated torque-box stiffness data, gross weight 1
14	CD(400)	ACPROG	(18,0)	Calculated	CD(1401-1800)	WVFDD	(17,0)	Calculated torque-box stiffness data, gross weight 2
15	CD(400)	ACPROG	(18,0)	Calculated				Calculated torque-box stiffness data, gross weight 3
16								Not used

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
17	RATIO (264)	READ	(1,0)	Initialized to 1.0	RATIO (264)	WHVNET	(4,0)	Load factor, temperature, and content normalizing factors
	RATIO (264)	WHVNET	(4,0)	Calculated	RATIO (264)	ALOAD	(16,0)	
18	WLD(300)	DMAXLD	(2,0)	Calculated	WLD(300)	BLCNTL	(4,0)	Wing and empennage inertia loads per unit load factor and wing net taxi loads data
19	DV(2320)	DATAIN	(2,0)	Calculated	DV(2320)	OUTPUT	(13,0)	Calculated variables from data management module
20								Not used
21	D(200)	READ	(1,0)	Initialized to 0.0	WD(200)	MAXLDS	(4,0)	Wing and empennage geometry and design data
	WD(200)	DCCNTL	(2,0)	Calculated	WD(200)	CCNTL	(8,0)	
22	BC(195)	DATAIN	(2,0)	Calculated	BC(195) BC(195) BC(168)	OLAY3 BLCNTL WFLDD	(3,0) (4,0) (17,0)	Vehicle geometry and design data
23	D(2060)	READ	(1,0)	TAPE7 and "WING"	D(2060) D(2060)	READ CCNTL	(1,0) (8,0)	Input wing design data

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
24	D(2000)	READ	(1,0)	TAPE7, "GENERAL," and "FUS-ELAGE"	D(2000) D(2000)	READ FUS01	(1,0) (11,0)	Input fuselage design data
25	D(116) D(116)	READ DLNDGR	(1,0) (2,0)	TAPE7 and "LG" Calculated	D(116) D(116) D(116)	READ DLNDGR LANDGR	(1,0) (2,0) (6,0)	Input landing gear design data
26	D(2060)	READ	(1,0)	TAPE7 and "HORI-ZONTAL"	D(2060) D(2060)	READ CCNTL	(1,0) (8,0)	Input horizontal tail design data
27	D(2060)	READ	(1,0)	TAPE7 and "VERTI-CAL"	D(2060) D(2060)	READ CCNTL	(1,0) (8,0)	Input vertical tail design data
28	D(2000)	READ	(1,0)	TAPE7, "AIS," and "GEN-ERAL"	D(2000) D(2000)	READ AISMN	(1,0) (7,0)	Input air induction system and engine section design data

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
29	D(2400)	READ	(1,0)	Initialized to 0.0., replaced by "FATIGUE"	D(2400) D(2400)	READ FATGUE	(1,0) (5,0)	Input fatigue design data
30	ACL(900)	ACLOAD	(18,0)	Calculated	ACL(900)	AVLOAD	(18,0)	Design loads and loading condition data, advanced composite option
31	SVF(180)	OLAY3	(3,0)	Calculated	SVF(180)	BLCNTL	(4,0)	Ambient condition, temperature, and structural component material property data
32	D(198)	READ	(1,0)	Initialized to 0.0, replaced by "WHV LOADS"	D(198) DUM(198)	READ WHVNET	(1,0) (4,0)	Design airloads shear, moment, and torque data for wing and empennage
	DUM(198)	WHVNET	(4,0)	Calculated	SLD(198)	ALOAD	(16,0)	

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
33	D(672) FUS(672)	READ FUSNET	(1,0) (4,0)	Initial-ized to 0.0, replaced by "FUS LOADS" Calculated	D(672) FUS(672)	READ FUSLD	(1,0) (11,0)	Vehicle airloads, centers of pressure, and inertia factors
34	D(480) FUSDWI (480)	READ AVDINR	(1,0) (2,0)	Initial-ized to 0.0 replaced by "INERTIA" Calculated	D(480) FUSDWI (480)	READ FUSLD	(1,0) (11,0)	Vehicle and component weight, center of gravity, and pitch and yaw inertia and limit flight profile
35	DUMMY (830) DUMMY (830)	READ FATMG	(1,0) (4,0)	"FATIGUE" Calculated	DUMMY (830)	FATGUE	(5,0)	Wing bending moment spectra data
36	D(500)	READ	(1,0)	TAPE7	DAF(500)	GEOMW	(8,0)	Permanent file airfoil data

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
37	D(100)	READ	(1,0)	TAPE7	GJDAT (100) GJDAT (100)	WHVQQ GJTT	(3,0) (16,0)	Permanent file T-tail flutter data
38	D(50) SPAL(50) SPAL(50) DUMMY (50)	READ DWHVQQ WHVQQ WODATA	(1,0) (2,0) (3,0) (17,0)	Initial-ized to 0.0 Calculated Calculated Calculated	SPAL(50) SPAL(50) T(1001-1050) DUMMY (50)	DWHVQQ WHVQQ CONTL WODATA	(2,0) (3,0) (8,0) (17,0)	Speed-altitude profile and wing and empennage flutter design data
39	RLDS (132)	ACPROG	(18,0)	Calculated	RLDS (132)	ACPROG	(18,0)	Scratch storage and normalizing factors, advanced composite option
40	CD(400)	ACNSTR	(18,0)	Calculated	CD(400) CD(400)	ACPRTA ATBOPT	(18,0) (18,0)	Scratch storage and torque-box stiffness data, advanced composite option

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
41-60	TMF(300) TMD(300)	READ FTGCTL	(1,0) (5,0)	TAPE7 Calculated	TM(300) TMD(300) TMD(300) TMD(300) TMD(300)	WHVMAT FTGCTL MCNTL1 MTLCW MFCNTL	(3,0) (5,0) (7,0) (16,0) (11,0)	Permanent file material property data
61-84	S6(200)	FUSLD	(11,0)	Calculated	S6(200) S6(200)	FFRME LDCHK	(11,0) (12,0)	Fuselage net design loads data for each of 24 load conditions
85-100	TMS(120)	MFCNTL	(11,0)	Calculated	TMS(120) TMS(120)	SFOAWE LDCHK	(11,0) (12,0)	Fuselage structural component material property data for each of 24 load conditions
109-117	TMS(180)	MCNTL1	(7,0)	Calculated	TMS(180) TMS(180)	PYLONS NACELE PRECRT	(7,0) (7,0) (7,0)	Nacelle and duct material property data at each of 9 flight profile points
118	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque box optimization point 1
119	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque box optimization point 1
120	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque box optimization point 1

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
121	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 1
122	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 1
123	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 2
124	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 2
125	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 2
126	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 2
127	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 2
128	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 3
129	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 3

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
130	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 3
131	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 3
132	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque box optimization point 3
133	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 4
134	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 4
135	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 4
136	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 4
137	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 4
138	CD(150) TSC(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSC(150) TSC(150)	PROG TBOPT	(9,0) (9,0)	Scratch design data block 1, torque-box optimization point 5

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
139	CD(150) TWT(150)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TWT(150)	TBOPT	(9,0)	Scratch design data block 2, torque-box optimization point 5
140	CD(100) TSS(100)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TSS(100)	TBOPT	(9,0)	Scratch design data block 3, torque-box optimization point 5
141	CD(340) TC(340)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	TC(340)	TBOPT	(9,0)	Scratch design data block 4, torque-box optimization point 5
142	CD(400) CD(400)	PROG CNSTR	(9,0) (10,0)	Calculated Calculated	CD(400)	TBOPT	(9,0)	Scratch design data block 5, torque-box optimization point 5
143	TSC(200)	PROG	(9,0)	Calculated	TSC(200)	PROG	(9,0)	Scratch design data, gross weight change
144	YC(200)	CASE	(8,0)	Calculated	TG(200)	WODATA	(17,0)	Geometry data, aero and structural chord calculation
145	TGA(135)	WCONT	(15,0)	Calculated	TGA(135)	WODATA	(17,0)	Geometry data, mass distribution calculations
146	TG(300)	WCONT	(15,0)	Calculated	TG(300)	WODATA	(17,0)	Geometry data, mass distribution calculations
147	TGW(400)	WCONT	(15,0)	Calculated	TGW(400)	WODATA	(17,0)	Weight distribution and inertia loads data

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
148	CCW(50)	WCONT	(15,0)	Calculated	CCW(50)	WODATA	(17,0)	Weight summary data, leading and trailing edge structures
149	CLEI (150)	WLETE	(14,0)	Calculated	CLEI(150) CLEI(150)	WODATA WDDATA	(17,0) (16,0)	Calculated mass distribution data, leading edge structures
150	CTEI (150)	WLETE	(14,0)	Calculated	CTEI(150) CTEI(150)	WODATA WDDATA	(17,0) (16,0)	Calculated mass distribution data, trailing edge structures
151	CFL1I (150)	WCONT	(15,0)	Calculated	CFL1I (150)	WODATA	(17,0)	Calculated mass distribution data, fuel cell 1
152	CFL2I (150)	WCONT	(15,0)	Calculated	CFL2I (150)	WODATA	(17,0)	Calculated mass distribution data, fuel cell 2
153	CMII (150)	WCONT	(15,0)	Calculated	CMII (150)	WODATA	(17,0)	Calculated mass distribution data, miscellaneous contents and structures
154	CCDLI (150)	WCONT	(15,0)	Calculated	CCDLI (150)	WODATA	(17,0)	Calculated mass distribution data, concentrated mass items
155	TCS(150)	WODATA	(17,0)	Calculated	CTBI(150)	WODATA	(17,0)	Calculated mass distribution data, torque-box structures

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
156	CTBW(150) CTBW(150)	PROG ACPROG	(9,0) (18,0)	Calculated Calculated	CTBW(150)	WODATA	(17,0)	Calculated torque-box structure data for mass distribution analysis, gross weight 1
157	CTBW(150) CTBW(150)	PROG ACPROG	(9,0) (18,0)	Calculated Calculated	CTBW(150)	WODATA	(17,0)	Calculated torque box structure data for mass distribution analysis, gross weight 2
158	CTBW(150) CTBW(150)	PROG ACPROG	(9,0) (18,0)	Calculated Calculated	CTBW(150)	WODATA	(17,0)	Calculated torque-box structure data for mass distribution analysis, gross weight 3
159	WHVLID (24)	MAXLDS	(4,0)	Calculated	WHVLID (24)	ACLOAD	(18,0)	Load condition indicators
160-183	BO(200)	MAXLDS	(4,0)	Calculated	WBO(200)	ACLOAD	(18,0)	Wing and empennage airloads shear, bending moment, and torque for load conditions 1 through 24, advanced composite option

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONT)

Record No.	Write			Read				Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
184	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(400-499)	WODATA	(17,0)	Weight summary data, wing and empennage exposed panel structures, gross weight 1
185	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(500-599)	WODATA	(17,0)	Weight summary data, wing and empennage exposed panel structures, gross weight 2
186	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(600-699)	WODATA	(17,0)	Weight summary data, wing and empennage exposed panel structures, gross weight 3
187	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(800-899)	WODATA	(17,0)	Weight summary data, pivot and center-section structures, gross weight 1
188	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(900-999)	WODATA	(17,0)	Weight summary data, pivot and center-section structures, gross weight 2

TABLE 7. SWEEP PROGRAM MASS STORAGE FILE RECORDS (CONCL)

Record No.	Write				Read			Description
	Array Name & Size	Routine	Overlay	Source	Array Name & Size	Routine	Overlay	
189	CD(100) TSS(100) CD(100) TSS(100)	PROG TBOPT ACPROG ATBOPT	(9,0) (9,0) (18,0) (18,0)	Calculated Calculated Calculated Calculated	CD(1000-1099)	WODATA	(17,0)	Weight summary data, pivot and center-section structures, gross weight 3
190	CIOY(150) CCI(150)	WDDATA WODATA	(16,0) (17,0)	Calculated Calculated	CCI(150) CIOY(150)	WODATA WODATA	(17,0) (17,0)	Calculated mass distribution data for yaw inertia
191-200								Not used

TABLE 8. IFL ARRAY PROGRAM CONTROLS (IFLOW BLOCK)

IFL Loc	Control Card No. 2 Column	Description
1	71	Airloads module execution control 0 = execute 1 = do not execute
2	72	Wing execution control for wing and empennage module 0 = execute 1 = do not execute
3	73	Fuselage module execution control 0 = execute 1 = do not execute
4	74	Landing gear module execution control 0 = execute 1 = do not execute
5	75	Horizontal tail execution control for wing and empennage module 0 = execute 1 = do not execute
6	76	Vertical tail execution control for wing and empennage module 0 = execute 1 = do not execute
7	77	Air induction system module execution control 0 = execute 1 = do not execute
8	78	Fatigue module execution control 0 = execute 1 = do not execute
9	79	Final output module execution control 0 = execute 1 = do not execute
10	80	File initialization control for subsequent cases 0 = leave files as they exist and update with input data 1 = reinitialize data files from TAPE7

TABLE 8. IFL ARRAY PROGRAM CONTROLS (IFLOW BLOCK) (CONCL)

IFL Loc	Control Card No. 2 Column	Description
11	39-40	Wing construction indicator 00 = metal structure 01 = advanced composite
12	41-42	Horizontal tail construction indicator 00 = metal structure 01 = advanced composite
13	43-44	Vertical tail construction indicator 00 = metal structure 01 = advanced composite

The data management module develops compatible vehicle and structural component geometry data for use by the other design data development modules and the weight analysis modules. This module also provides weight distributions, balance, and inertia required for the evaluation of design loads. Performance requirements are also organized for use by the airloads module. Methods, functions, processes, and description of the data management module are presented in Part 2 of this volume.

Detail discussions of the flutter and temperature module are presented in Volume IV. This module calculates critical surface flutter design parameters for the wing, horizontal tail, and vertical tail. T-tail flutter is also evaluated for the vertical tail. Structural temperatures are calculated at critical flutter conditions and at the flight load evaluation conditions.

The airloads module develops design airloads and wing bending moment fatigue spectra. Component airloads and centers of pressure are calculated for a number of flight conditions to provide reasonable expectation that the maximum airloads are encompassed. Module methods, formulations, and program description are given in Volume III.

The fatigue module evaluates wing bending moment spectra and fuselage pressure cycle data to determine allowable operating stresses. These allowables are stored in the material property files for use by the wing and fuselage analysis modules. Methods, formulations, and program description are presented in Volume IV.

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
1	READ	(1,0)	FATGUE AISMN CCNTL MFCNTL	(5,0) (7,0) (8,0) (11,0)	Number of arrays of material properties in mass storage in records 41-60
2	OLAY00	(0,0)	CCNTL ALOAD	(8,0) (16,0)	Component indicator for wing and empennage module 1 = wing 2 = horizontal tail 3 = vertical tail
3	OLAY00 PROG	(0,0) (9,0)	OLAY00	(0,0)	Set to 0.0 in OLAY00; set to 1.0 at end of PROG so that OLAY00 will call OLAY17.
4	OLAY00	(0,0)	READ CCNTL	(1,0) (8,0)	Case number
5	WHVQQ	(3,0)	CCNTL	(8,0)	Dynamic pressure for wing flutter design, lb/ft^2
6	WHVQQ	(3,0)	CCNTL	(8,0)	Dynamic pressure for horizontal tail flutter design, lb/ft^2
7	WHVQQ	(3,0)	CCNTL	(8,0)	Dynamic pressure for vertical tail flutter design, lb/ft^2
8	WHVNET	(4,0)	CCNTL	(8,0)	Wing design (reference) temperature, °F
9	WHVNET	(4,0)	CCNTL	(8,0)	Horizontal tail design (reference) temperature, ° F
10	WHVNET	(4,0)	CCNTL	(8,0)	Vertical tail design (reference) temperature, ° F
11	OLAY00 READ	(0,0) (1,0)	READ	(1,0)	Case indicator 1.0 = first case 2.0 = subsequent case

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
12	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing aspect ratio (wing fixed or aft)
13	WHVGEO	(2,0)	SVFTAB CCNTL	(3,0) (8,0)	Sweep of wing quarter-chord (wing fixed or aft), deg
14	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing taper ratio (wing fixed or aft)
15	READ	(1,0)	WHVQQ WHVMAT MAXLDS WHVNET FTGCTL	(3,0) (3,0) (4,0) (4,0) (5,0)	Wing material identification number
16	WHVGEO	(2,0)	SVFTAB	(3,0)	Horizontal tail aspect ratio
17	WHVGEO	(2,0)	SVFTAB	(3,0)	Sweep of horizontal tail quarter-chord, deg
18	WHVGEO	(2,0)	SVFTAB	(3,0)	Horizontal tail taper ratio
19	READ	(1,0)	WHVQQ WHVMAT MAXLDS WHVNET	(3,0) (3,0) (4,0) (4,0)	Horizontal tail material identification number
20	WHVGEO	(2,0)	SVFTAB	(3,0)	Vertical tail aspect ratio
21	WHVGEO	(2,0)	SVFTAB	(3,0)	Sweep of vertical tail quarter-chord, deg
22	WHVGEO	(2,0)	SVFTAB	(3,0)	Vertical tail taper ratio
23	READ	(1,0)	WHVQQ WHVMAT MAXLDS WHVNET	(3,0) (3,0) (4,0) (4,0)	Vertical tail material identification number

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
24	READ	(1,0)	DATAIN	(2,0)	Maximum taxi weight; if not defined, additional landing gear design data are transferred to record 25
25	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing aspect ratio (forward position variable-sweep only)
26	WHVGEO	(2,0)	SVFTAB CCNTL	(3,0) (8,0)	Sweep of wing quarter-chord (forward position variable-sweep only), deg
27	WHVGEO	(2,0)	SVFTAB	(3,0)	Wing taper ratio (forward position variable-sweep only)
28	WHVQQ	(3,0)	CCNTL	(8,0)	Wing structural material shear modulus at design flutter point, $lb/in.^2$
29	WHVQQ	(3,0)	CCNTL	(8,0)	Horizontal tail structural material shear modulus at design flutter point, $lb/in.^2$
30	WHVQQ	(3,0)	CCNTL	(8,0)	Vertical tail structural material shear modulus at design flutter point, $lb/in.^2$
31	READ	(1,0)	FTGCTL	(5,0)	Fuselage cover material identification number
32	BLCNTL	(4,0)	FATGUE	(5,0)	Maximum net unswept wing bending moment at side of fuselage station, in.-lb
33	BLCNTL	(4,0)	FATGUE	(5,0)	Maximum net swept wing bending moment at wing station 2, in.-lb
34	DFATMG	(2,0)	FATGUE	(5,0)	Vehicle service life, hr
35	READ	(1,0)	FUSNET	(4,0)	Vehicle sink speed at landing design weight, ft/sec

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
36	READ	(1,0)	FUSNET	(4,0)	Main landing gear stroke, in.
37	READ	(1,0)	FUSNET	(4,0)	Ratio of ultimate to limit design factor
38	READ	(1,0)	FUSNET	(4,0)	Taxi load factor
39	OLAY00 PROG TBOPT	(0,0) (9,0) (9,0)	PROG TBOPT	(9,0) (9,0)	Wing and empennage module flow control; initialized to 0.0 by OLAY00 at start of module execution.
40	OLAY00 READ	(0,0) (1,0)	OLAY00	(0,0)	Indicator set to 1.0 in OLAY00; set to 0.0 in READ if GENERAL data are input
41	READ	(1,0)	FTGCTL	(5,0)	Fuselage minor frame material identification number
42	WHVNET	(4,0)	VLOAD VLOAD1	(9,0) (16,0)	Indicator to designate that horizontal tail loads have been reversed 0.0 = loads have not been reversed 1.0 = loads have been reversed
43	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at basic flight design weight (wing fixed or aft) at side of fuselage station, in.-lb
44	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at basic flight design weight (wing fixed or aft) at wing station 2, in.-lb
45	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at maximum design weight (wing fixed or fwd) at side of fuselage station, in.-lb

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
46	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at basic flight design weight (wing fwd) at side of fuselage station, in.-lb
47	DFATMG	(2,0)	BLCNTL	(4,0)	Unsweptwing inertia bending moment per g at landing design weight(wing fwd) at side of fuselage station, in.-lb
48	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at maximum design weight (wing fwd) at station 2, in.-lb
49	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at basic flight design weight (wing fwd) at station 2, in.-lb
50	DFATMG	(2,0)	BLCNTL	(4,0)	Sweptwing inertia bending moment per g at landing design weight (wing fwd) at station 2, in.-lb
51	READ	(1,0)	BLCNTL	(4,0)	Air vehicle class indicator 1.0 = fighter (F) 2.0 = attack (A) 3.0 = tactical bomber (BI) 4.0 = strategic bomber (BII) 5.0 = cargo assault (CA) 6.0 = cargo transport (CT)
52	READ	(1,0)	BLCNTL	(4,0)	Wing-type indicator -1.0 = fixed wing 1.0 = variable sweep wing
53	READ	(1,0)	DCCNTL WHVQQ BLCNTL	(2,0) (3,0) (4,0)	Vertical-tail-type indicator -1.0 = single tail 0.0 = dual tail 1.0 = T-type tail

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
54	READ	(1,0)	BLCNTL	(4,0)	Load calculation option indicator -1.0 = calculate basic loads only 0.0 = calculate fatigue spectra only 1.0 = calculate both basic loads and fatigue spectra
55	READ	(1,0)	BLCNTL	(4,0)	Total vehicle load calculation control 1.0 = compute all loads (fuselage, wing, horizontal, vertical) 0.0 = compute loads as indicated by controls locations 56 through 59
56	READ	(1,0)	BLCNTL	(4,0)	Fuselage load calculation indicator 1.0 = compute 0.0 = do not compute
57	READ	(1,0)	BLCNTL	(4,0)	Wing load calculation indicator 1.0 = compute 0.0 = do not compute
58	READ	(1,0)	BLCNTL	(4,0)	Horizontal tail load calculation indicator 1.0 = compute 0.0 = do not compute
59	READ	(1,0)	BLCNTL	(4,0)	Vertical tail load calculation indicator 1.0 = compute 0.0 = do not compute
60	READ	(1,0)	BLCNTL	(4,0)	Load conditions 1 through 5 calculation indicator (positive maneuver conditions) 1.0 = compute 0.0 = do not compute

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
61	READ	(1,0)	BLCNTL	(4,0)	Load conditions 6 and 7 calculation indicator (negative maneuver conditions) 1.0 = compute 0.0 = do not compute
62	READ	(1,0)	BLCNTL	(4,0)	Load condition 8 calculation indicator (flap-down maneuver condition) 1.0 = compute 0.0 = do not compute
63	READ	(1,0)	BLCNTL	(4,0)	Load condition 9 calculation indicator (flaps-down landing) 1.0 = compute 0.0 = do not compute
64	READ	(1,0)	BLCNTL	(4,0)	Load conditions 10 through 13 calculation indicator (positive vertical gust conditions) 1.0 = compute 0.0 = do not compute
65	READ	(1,0)	BLCNTL	(4,0)	Load conditions 14 through 17 calculation indicator (negative vertical gust conditions) 1.0 = compute 0.0 = do not compute
66	READ	(1,0)	BLCNTL	(4,0)	Load conditions 18 and 19 calculation indicator (lateral gust conditions) 1.0 = compute 0.0 = do not compute
67	READ	(1,0)	BLCNTL	(4,0)	Load conditions 20 and 21 calculation indicator (pitching acceleration conditions) 1.0 = compute 0.0 = do not compute

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONT)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
68	READ	(1,0)	BLCNTL	(4,0)	Load conditions 22 and 23 calculation indicator (yawing acceleration conditions) 1.0 = compute 0.0 = do not compute
69	READ	(1,0)	BLCNTL	(4,0)	Wing fatigue spectra calculation indicator -1.0 = compute gust and maneuver spectra 1.0 = compute gust spectra only
70	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "GENERAL "
71	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "WING "
72	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "HORIZONTAL"
73	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "VERTICAL "
74	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "FUSELAGE "
75	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "LG "
76	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "AIS "
77	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "FATIGUE "
78	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "WHV LOADS "
79	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "FUS LOADS "

TABLE 9. XMISC ARRAY VARIABLES (MISC BLOCK) (CONCL)

Loc	Defined		Used		Description
	Routine	Overlay	Routine	Overlay	
80	OLAY00	(0,0)	READ	(1,0)	Input data deck identification "INERTIA "
81	OLAY00	(0,0)	READ	(1,0)	End of case data identification "EXECUTE "
82	OLAY00	(0,0)			Alphanumeric characters, "WING"
83	OLAY00	(0,0)			Alphanumeric characters, "H.T."
84	OLAY00	(0,0)			Alphanumeric characters, "V.T."
85-100	READ	(1,0)	OLAY00 READ SPDALT DSGNPR AISMN SPAL DSGNP DUCTS NACELE SUMARY CCNTL PRTG PRTA PRTH PRTB PRTC WLETE PRTD ACPRTA PRTB PRTC PRTH	(0,0) (1,0) (2,0) (2,0) (7,0) (7,0) (7,0) (7,0) (7,0) (7,0) (8,0) (8,0) (9,0) (9,0) (10,0) (10,0) (14,0) (17,0) (18,0) (18,0) (18,0) (18,0)	Case title (alphanumeric information on first two cards in the input deck for each case)

STRUCTURAL WEIGHT ESTIMATION

Air vehicle structural component weight analysis modules calculate structural weights for:

1. Wing (refer to Volume VI)
2. Horizontal tail (refer to Volume VI)
3. Vertical tail (refer to Volume VI)
4. Fuselage (refer to Volume VII)
5. Landing gear (refer to Volume V)
6. Nacelles, engine section, and air induction system (refer to Volume V)

Computed weights are derived so that detail weight data are available at the end of the evaluation phase. Modules which evaluate these components may be operated in stand-alone modes or in the integrated mode by using data from the design data development modules.

OUTPUT

Several levels of printed output are provided from the modules that are executed in the computation process. Summary weight results and error and warning messages are standard program output. Other types of program output are controlled through user selection of print indicators.

Figure 6 shows typical output from the fuselage module. The basic output, Figure 7, is the integrated summary of results from each of the weight analysis modules. This summary is organized in the final output module, Overlay (13,0). Initial assumptions (Figure 8) and dimensional and structural data (Figure 9) are other summary information printed by the output module.

Error and warning messages are printed when data compatibility problems are encountered or when problem definitions are beyond the program limitations. These messages describe the problem and the path taken to circumvent the situation. This allows for completion of downstream computations which may produce unrelated errors.

Optional output that can be printed through control card indicators is as follows:

1. Details of weight analysis results

2. Details of structural synthesis results

3. Details of design data and requirements

4. Details of intermediate program calculations

A complete guide for the selection of print indicators is presented in Volume IX, Users' Manual.

BULKHEADS AND FRAMES			
	351.00	168.4	
	998.00	1530.9	
	1058.00	100.4	
	734.00	396.8	
	958.00	860.1	
	1641.00	160.6	
	1728.00	119.8	
	1314.47	402.1	
	272.00	48.2	
	452.00	583.5	
	1398.00	157.0	
MINOR FRAMES		1897.5	
JOINTS, SPLICES AND FASTENERS		616.3	
COVERING - UPPER BETWEEN LONGERONS		903.3	
- SIDE BETWEEN LONGERONS		2248.7	
- LOWER BETWEEN LONGERONS		797.8	
COVERING LONGITUDINAL STIFFENERS - UPPER BETW. LONG.		545.5	
- SIDE BETW. LONG.		1188.8	
- LOWER BETW. LONG.		734.4	
LONGERONS - UPPER		537.0	
- LOWER		469.7	
ENGINE DRAG		0.0	
LONGITUDINAL PARTITIONS - (STRUCTURAL)		1169.5	
FLOORING AND SUPPORTS - (BASIC STRUCTURE)		3421.1	
FITTINGS		167.2	
TOTAL - BASIC STRUCTURE			19224.6

Figure 6. Sample output of fuselage weight summary.

*** BODY GROUP *** ** SPRINT *
SECONDARY STRUCTURE

ENCLOSURES (EXCLUDING TURRET ENCLOSURES)		
CANOPY - PILOT	0.0	
WINDSHIELD (EXCLUDING BULLET PROTECTION)	298.6	
WINDOWS AND PORTS INCL. FRAMES	300.5	
WINDOWS AND PORTS - CABIN	6.3	
FLOORING AND SUPPORTS (SECONDARY STRUCTURE)	404.4	
STAIRWAYS AND LADDERS (FIXED)	32.4	
NOSE RADOME	96.3	
SPEED BRAKES - STRUCTURE AND SUPPORTS	0.0	
TOTAL SECONDARY STRUCTURE		1138.6

Figure 6. Sample output of fuselage weight summary (cont).

*** BODY GROUP ***
SECONDARY STRUCTURE
(DOORS, PANELS AND MISCELLANEOUS)

	AREA-SQ.FT.	
DOORS AND FRAMES		
- MAIN GEAR	163.0	863.9
- NOSE GEAR	32.9	164.5
- AFT CARGO	395.3	1117.4
- AFT RAMP	108.5	1071.4
- PRESSURE	65.7	470.9
- BOMB	0.0	0.0
- GUN		0.0
- AMMO		0.0
- ESCAPE	24.2	471.9
- ESCAPE	18.5	185.0
- PARATROOP	42.4	466.4
- ENTRANCE	12.2	122.0
- ACCESS		113.3
PANELS (NON STRUCTURAL)		
- SPOILER DEFLECTOR		20.0
- MAIN GEAR POD	700.0	1181.4
WALKWAYS, STEPS, GRIPS		168.2
ANTI-SKID PROTECTION		58.9
FAIRING AND FILLETS		0.0
EXTERIOR FINISH		0.0
INTERIOR FINISH		248.6
TOTAL SECONDARY STRUCTURE (DOORS, PANELS, MISC.)		6723.8
TOTAL - BASIC STRUCTURE		19224.6
TOTAL SECONDARY STRUCTURE		1138.6
TOTAL - BODY GROUP		27087.0

Figure 6. Sample output of fuselage weight summary (concl).

GROUP WEIGHT STATEMENT

USEFUL LOAD AND GROSS WEIGHT

LOAD CONDITION	MAXIMUM DESIGN WEIGHT		FLIGHT DESIGN GROSS WEIGHT		LANDING DESIGN GROSS WEIGHT	
	WEIGHT	ARM	WEIGHT	ARM	WEIGHT	ARM
CREW (NO. 4.0)	860.0	351.30	860.0	351.30	860.0	351.30
FUEL						
UNUSABLE	2164.0	1001.90	2164.0	1001.9	2164.0	1001.90
INTERNAL	67640.0	858.00	65740.0	858.00	28090.0	858.00
	49040.0	1047.34	49040.0	1047.34	28090.0	1047.34
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.0	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.0	0.0	0.00
OIL	416.0	753.61	416.0	753.6	416.0	753.61
FUSELAGE PAYLOAD	70000.0	887.00	70000.0	887.00	70000.0	887.00
WING PAYLOAD	0.0	0.00	0.0	0.00	0.0	0.00
ARMAMENT						
GUNS (QTY. 0.0)	0.0	0.00	0.0	0.00	0.0	0.00
AMMUNITION	0.0	0.00	0.0	0.00	0.0	0.00
INSTALLATIONS (PYLONS RACKS ETC.)						
WING	0.0	0.00	0.0	0.0	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
FUSELAGE	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
EQUIPMENT						
OXYGEN, LN2	0.0	0.00	0.0	0.00	0.0	0.00
MISCELLANEOUS	236.0	852.97	236.0	852.97	236.0	852.97
USEFUL LOAD	190356.0	916.55	188456.0	917.15	129856.0	913.29
WEIGHT EMPTY	118880.8	924.11	118880.8	924.11	118880.8	924.11
GROSS WEIGHT	309236.8	919.46	307336.8	919.8	248736.9	918.46

Figure 7. Sample output of group weight statement.

G R O U P W E I G H T S T A T E M E N T

WEIGHT EMPTY

WING GROUP					31429.2
CENTER SECTION - BASIC STRUCTURE				2237.0	
OUTER PANEL - BASIC STRUCTURE(INCL. TIPS 39.9 LBS.)				25308.9	
PIVOT				0.0	
AILERONS				743.3	
FLAPS - TRAILING EDGE				2414.8	
FLAPS - LEADING EDGE				0.0	
SLATS				0.0	
SPOILERS				725.3	
MISCELLANEOUS				712.0	
HORIZONTAL TAIL GROUP					2350.9
CENTER SECTION/SPINDLE				0.0	
STABILIZER - BASIC STRUCTURE				1832.4	
ELEVATOR				518.6	
MISCELLANEOUS				46.1	
VERTICAL TAIL GROUP					2170.2
CENTER SECTION/SPINDLE				0.0	
FINS - BASIC STRUCTURE				1898.8	
RUDDER				271.5	
MISCELLANEOUS				63.2	
BODY GROUP					26749.7
FUSELAGE BASIC STRUCTURE				19013.3	
SECONDARY STRUCTURE - FUSELAGE				1138.6	
- DOORS, PANELS, AND MISC.				6597.8	
ALIGHTING GEAR GROUP					9041.2
LOCATION	WHEELS, BRAKES TIRES, TUBES	STRUCTURE	CONTROLS		
FUSELAGE - MAIN GEAR	3303.2	2739.7	2823.6	8366.5	
FUSELAGE - NOSE GEAR	317.1	150.5	207.2	674.8	
SURFACE CONTROLS GROUP					3714.0
ENGINE SECTION					3848.0
INBOARD				1907.0	
CENTER					
OUTBOARD				1912.2	
DOORS, PANELS, AND MISC.				28.5	
STRUCTURE - OTHER AND MISC.					0.0

Figure 7. Sample output of group weight statement (cont).

TOTAL (TO BE BROUGHT FORWARD)			79303.3

GROUP WEIGHT STATEMENT

WEIGHT EMPTY

PROPULSION GROUP			25239.5
ENGINE INSTALLATION		18759.0	
ACCESSORY GEAR BOXES AND DRIVES		0.0	
AIR INDUCTION SYSTEM		611.5	
STRUCTURE	611.5		
ACTUATION AND CONTROLS	0.0		
EXHAUST SYSTEM		3577.0	
COOLING SYSTEM AND DRAIN PROVISIONS		144.0	
LUBRICATING SYSTEM		212.0	
FUEL SYSTEM		1380.0	
ENGINE CONTROLS		236.0	
STARTING SYSTEM		320.0	
AUXILIARY POWER PLANT GROUP			554.0
INSTRUMENTS GROUP			1122.0
HYDRAULICS AND PNEUMATICS GROUP			1489.0
ELECTRICAL GROUP			2650.0
ELECTRONICS GROUP			2347.0
ARMAMENT GROUP			0.0
FURNISHINGS AND EQUIPMENT GROUP			3320.0
AIR CONDITIONING AND ANTI-ICING EQUIPMENT GROUP			2648.0
PHOTOGRAPHIC GROUP			0.0
AUXILIARY GEAR GROUP			95.0
OTHER EQUIPMENT AND MISC.			113.0
TOTAL FROM PREVIOUS PAGE			79303.3
WEIGHT EMPTY			118840.8

Figure 7. Sample output of group weight statement (concl).

INITIAL WEIGHT AND BALANCE DATA

	WEIGHT	HORIZ. ARM
WEIGHT EMPTY	127644.01	953.07
WING	35648.92	982.76
HORIZONTAL	3658.32	1847.43
VERTICAL	2165.62	1750.99
BODY	27565.33	1062.30
MAIN GEAR	8136.67	922.72
NOSE GEAR	847.94	356.58
SURFACE CONTROLS	3714.00	1121.80
ENGINE SECTION	6112.25	796.53
OTHER STRUCTURE	0.00	0.00
ENGINE	18759.00	774.10
ACCESSORY GEAR BOXES	0.00	0.00
AIR INDUCTION SYSTEM	828.97	699.04
AIS ACTUATION AND CONTROLS	0.00	0.00
EXHAUST SYSTEM	3577.00	845.67
COOLING AND DRAINS	144.00	803.90
LUBRICATING SYSTEM	212.00	840.80
FUEL SYSTEM	1380.00	953.40
ENGINE CONTROLS	236.00	666.20
STARTING SYSTEM	320.00	768.30
AUXILIARY POWER UNIT	554.00	844.70
INSTRUMENTS	1122.00	545.00
HYDRAULIC	1489.00	881.90
ELECTRICAL	2650.00	657.50
ELECTRONICS	2347.00	592.40
ARMAMENT	0.00	0.00
FURNISHINGS	3320.00	596.80
AIR CONDITIONING	2648.00	809.90
PHOTOGRAPHIC	0.00	0.00
AUXILIARY GEAR	95.00	1228.00
OTHER EQUIPMENT	113.00	300.00

Figure 8. Sample output of initial weight empty balance data.

GROUP WEIGHT STATEMENT

DIMENSIONAL AND STRUCTURAL DATA

LENGTH - OVERALL (FT.) 141.53 HEIGHT - OVERALL - STATIC (T.) 38.55

	FUSELAGE	INBOARD	NACELLES CENTER	OUTBOARD
LENGTH - MAX. (FT.)	132.29	16.60		16.60
DEPTH - MAX. (FT.)	14.17	5.50		5.50
WIDTH - MAX. (FT.)	14.17	5.50		5.50
WETTED AREA (SQ. FT.)	4972.76	277.19		277.19
FUSELAGE VOLUME (CU. FT.)	16020.63			

	WING	H. TAIL	V. TAIL
GROSS AREA (SQ. FT.)	3002.83	483.00	416.00
WEIGHT/GROSS AREA (LBS./SQ. FT.)	10.47	4.87	5.22
SPAN (FT.)	159.95	50.35	22.72
SWEEPBACK - AT .25C (DEGREES)	25.92	25.00	35.00
THEORETICAL ROOT CHORD - LENGTH (INCHES)	317.87	168.08	273.11
- MAX. THICKNESS (INCHES)	51.90	17.65	35.50
THEORETICAL TIP CHORD - LENGTH (INCHES)	132.70	62.17	166.30
- MAX. THICKNESS (INCHES)	13.27	6.53	21.62
TAIL LENGTH - .25 MAC WING TO .25 MAC H. TAIL (FT.)		74.20	

ALIGHTING GEAR	NOSE	MAIN
LENGTH - OLEO EXTENDED - AXLE TO TRUNNION (INCHES)	41.50	61.70
OLEO TRAVEL - FULL EXTENDED TO FULL COLLAPSED (INCHES)	12.00	28.90

STRUCTURAL DATA - CONDITION	STRESS GROSS WEIGHT	LIMIT LOAD FACTOR
FLIGHT	316100.00	2.50
LANDING	257500.02	
TAKE-OFF	318000.01	
LIMIT AIRPLANE LANDING SINK SPEED (FT./SEC.)		10.00
WING LIFT ASSUMED FOR LANDING DESIGN CONDITION (PERCENT WT.)		100.00
STALL SPEED - LANDING CONFIGURATION - POWER OFF (KNOTS)		103.00
PRESSURIZED CABIN - ULT. DESIGN PRESSURE DIFFERENTIAL - FLIGHT (P.S.I)		18.47

Figure 9. Sample output of dimensional and structural data.

Section IV

SWEEP CONTROL PROGRAM

PROGRAM DESCRIPTION

The function of the SWEEP control program, OLAY00, is to initialize the input/output device, mass storage device, and to control the execution of the problem. CDC system routine OPENMS is used to open the mass storage file, which consists of 200 records.

This program initializes the data deck identification titles in labeled common block MISC, clears the first 50 cells of the MISC block, and initializes the case counter and indicator. Input data are then processed by calling the input data processing module. The input data processing module organizes executive controls and key words in the labeled common blocks IFLOW and MISC. These controls are then used to proceed through the problem as shown in the logic flow diagram, Figure 10.

This program does not perform any calculations.

BLANK COMMON

Blank common is not used.

SCRATCH ARRAYS

The IF1 array is used to define the integer counter and number of records in the mass storage file. IND and N are scratch counters.

LABELED COMMON

IP(40) Print/no-print indicator
0 = print module titles
1 = do not print

IFL Program flow controls (refer to Table 8)

XMISC(2) Lifting surface identification
1.0 = wing
2.0 = horizontal tail
3.0 = vertical tail

XMISC(3) Wing and empennage structural analysis completion code
0 = analysis not complete
1.0 = analysis complete

XMISC(4) Problem case number

XMISC(11) Problem case indicator
1.0 = first case
2.0 = second and subsequent cases

XMISC(39) Wing and empennage module flow control, initialized to 0.0

XMISC(40) Data management and flutter and temperature modules flow control, defined by presence or omission of "GENERAL" data deck in problem case
1.0 = do not execute
0.0 = execute

XMISC(70) to XMISC(81) Alphanumeric input data deck descriptive titles (refer to Table 9)

MASS STORAGE FILE RECORDS

File 1, consisting of 200 records defined (OPENMS).

ERROR MESSAGES

There are no error messages.

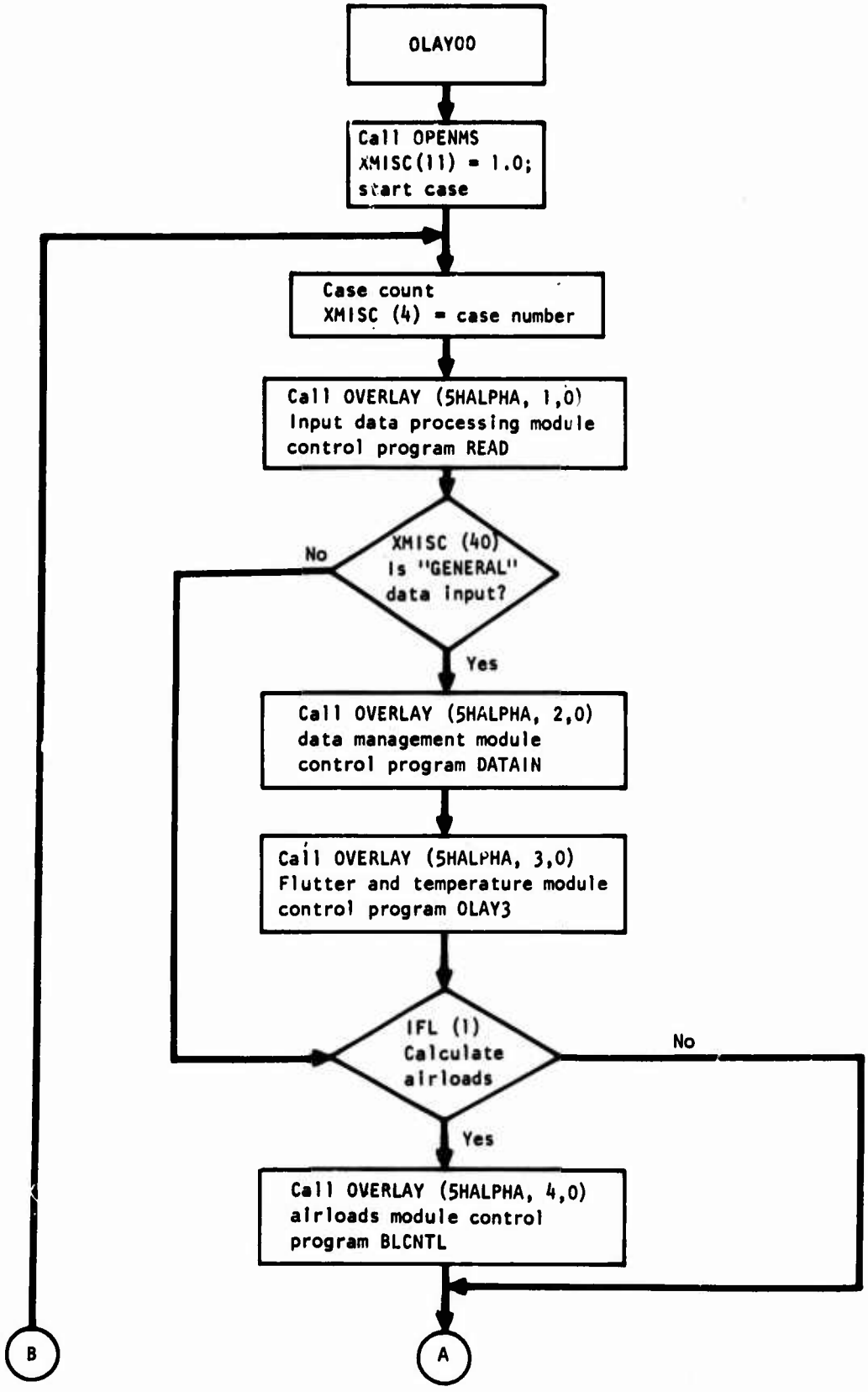


Figure 10. SWEEP control program logic flow diagram.

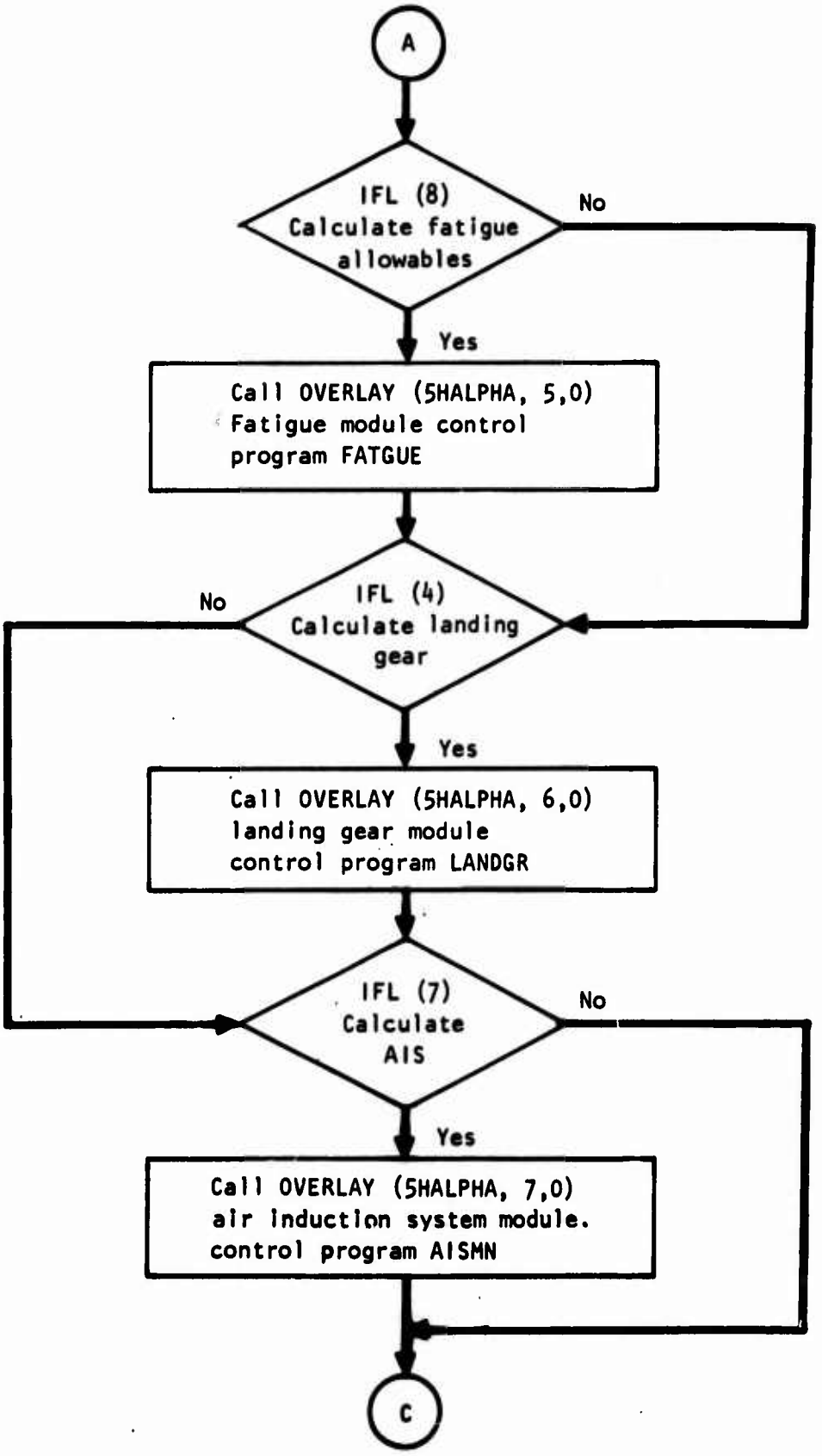


Figure 10. SWEEP control program logic flow diagram (cont).

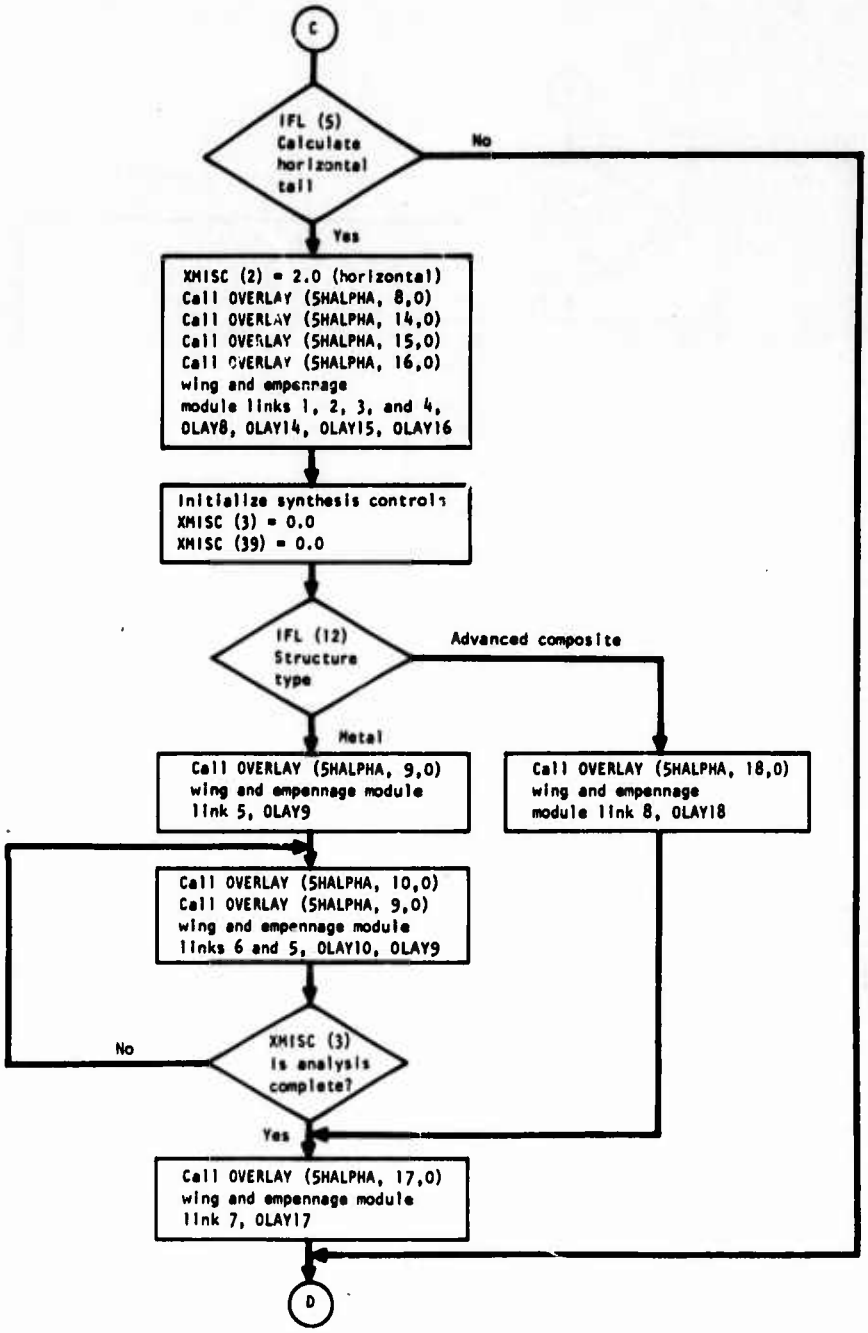


Figure 10. SWEEP control program logic flow diagram (cont).

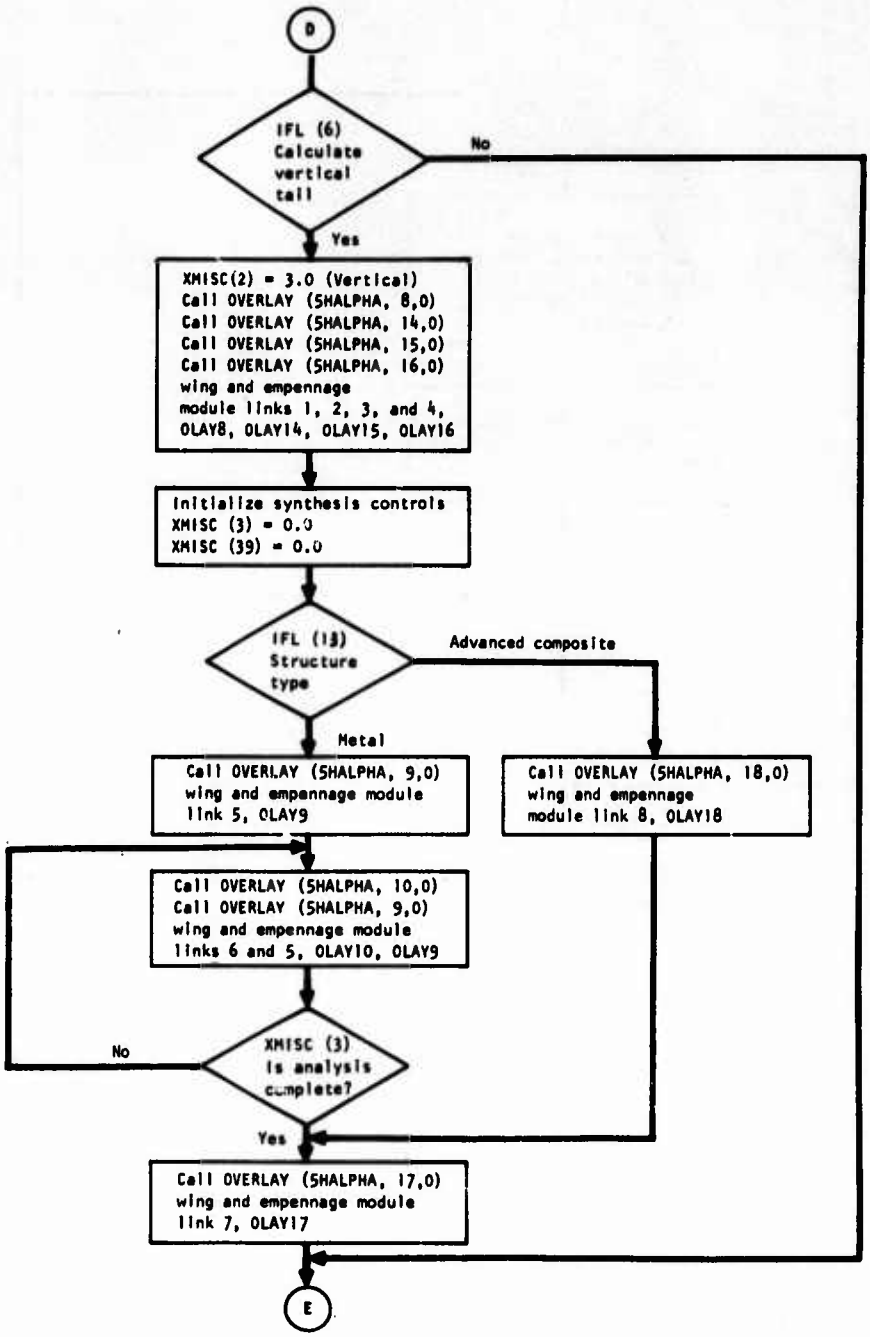


Figure 10. SWEEP control program logic flow diagram (cont).

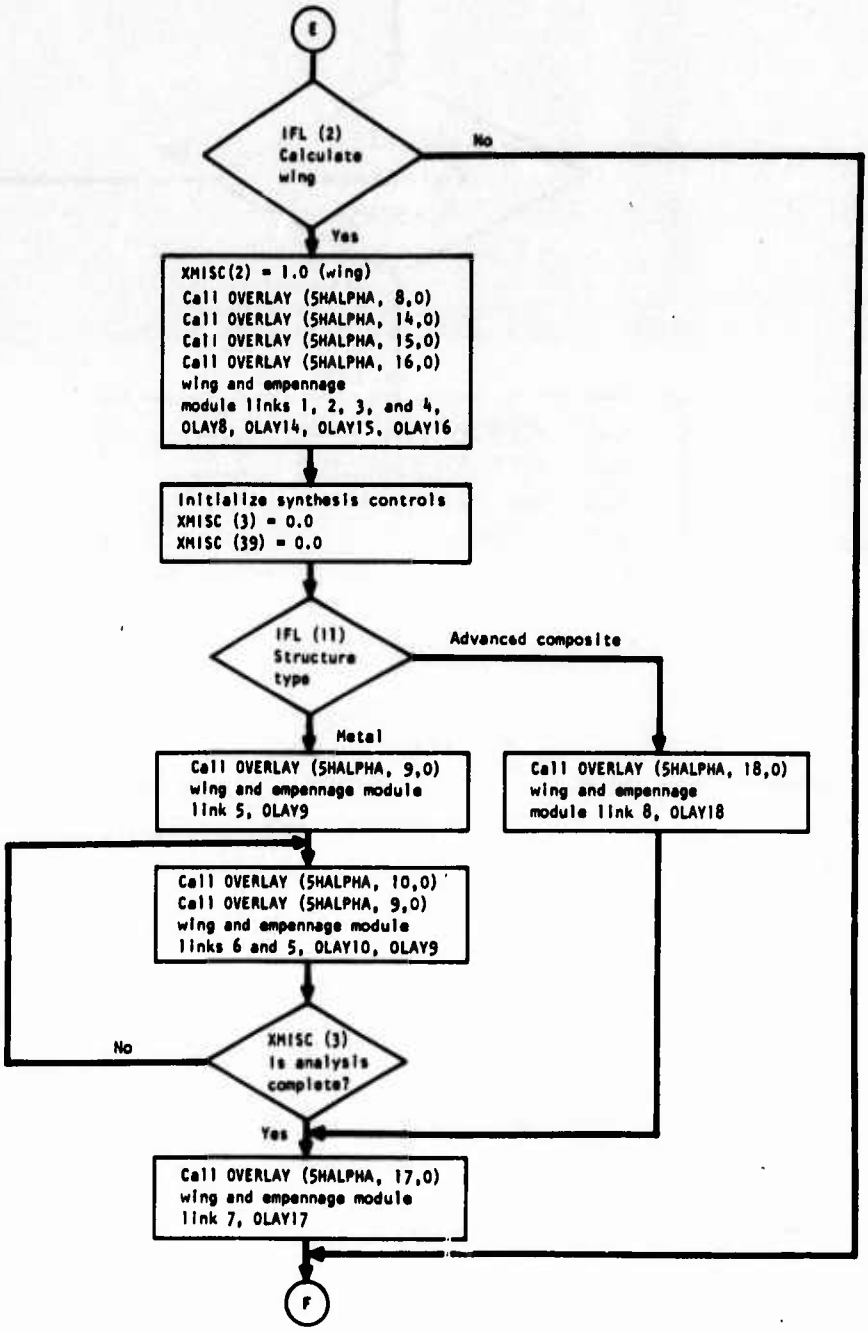


Figure 10. SWEEP control program logic flow diagram (cont).

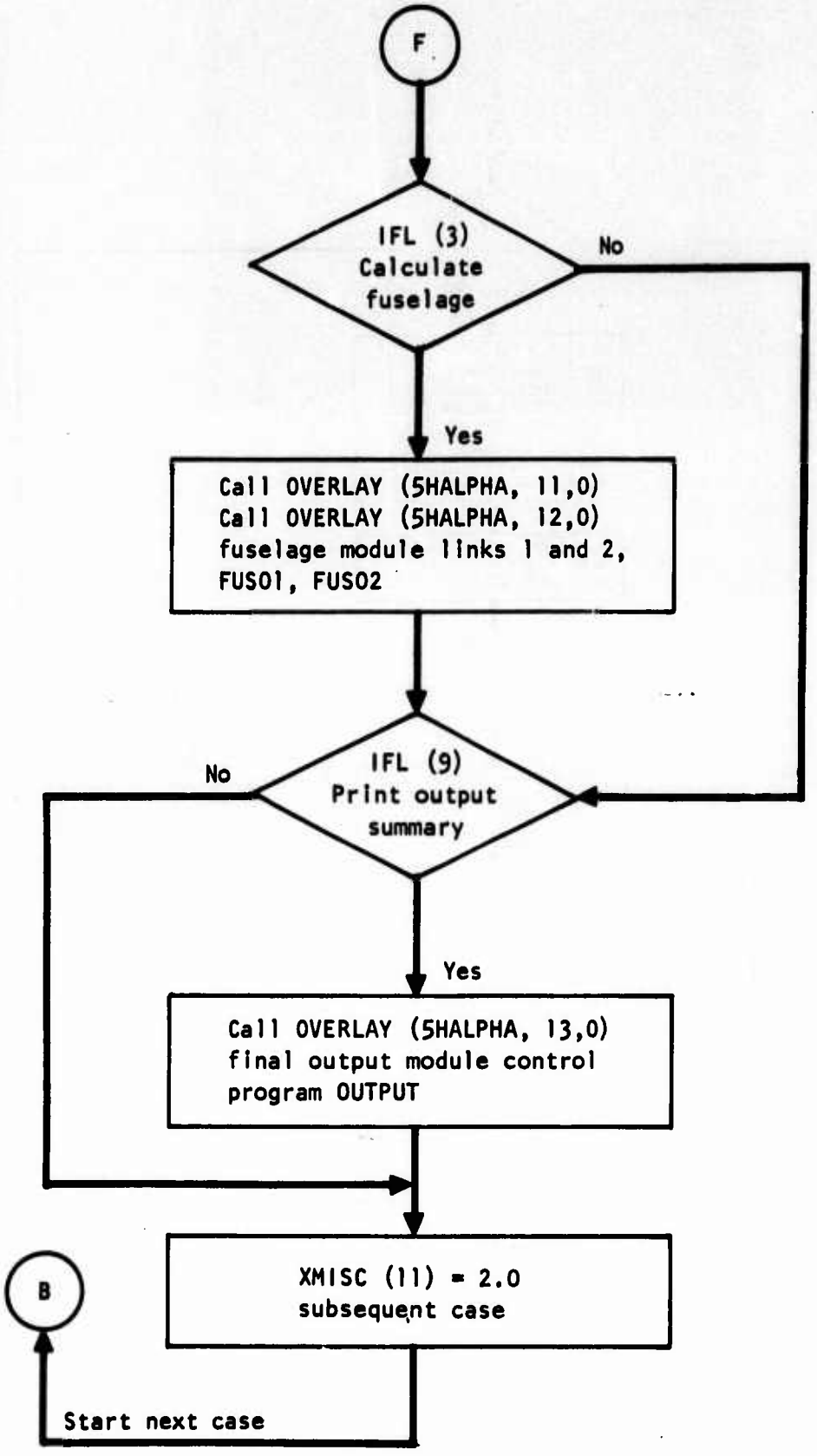


Figure 10. SWEEP control program logic flow diagram (concl).

SWEEP CONTROL PROGRAM FLOW CHARTS AND FORTRAN LISTS

01/20/74 TABLE OF CONTENTS AND REFERENCES AUTOFLOW CHART SET - SHEEP PAGE 1
CARD ID PAGE/BOX NAME REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)

FORTRAN MIXALE OVERLAY CONTROL PROGRAM

CHART TITLE - INTRODUCTION / COMMENTS

CHART TITLE - PROCEDURES

(0000032) 2.03 3333
(0000032) 2.03 (0000032) 2.04
(0000037) 2.05 100 (0000233) 9.02
(0000040) 2.00 9021 (0000044) 2.00
(0000230) 2.11 00 (0000040) 2.10 (0000074) 3.01 (0000094) 3.07 (0000074) 3.11 (0000000) 9.04
(0000000) 9.00 (0000100) 9.04 (0000144) 8.05 (0000170) 7.05 (0000210) 8.05
(0000227) 8.10
(0000240) 2.14 71 (0000230) 2.13
(0000000) 3.01 70 (0000040) 2.10 (0000310) 11.03
(0000000) 3.04 01 (0000243) 2.14 (0000004) 3.03
(0000000) 3.05 0032 (0000244) 2.00
(0000002) 3.05 0001 (0000000) 3.05
(0000000) 3.00 00 (0000004) 3.07 (0000300) 11.02
(0000070) 3.00 0002 (0000000) 3.05
(0000072) 3.10 0003 (0000070) 3.00
(0000076) 9.01 02 (0000074) 3.11 (0000247) 9.03
(0000000) 9.02 0004 (0000070) 3.00
(0000003) 9.03 0007 (0000200) 9.02
(0000007) 9.05 03 (0000005) 9.04 (0000250) 9.04
(0000001) 9.05 0000 (0000000) 9.02
(0000003) 9.07 0000 (0000011) 9.05
(0000007) 9.01 04 (0000005) 9.00 (0000250) 9.05
(0000102) 9.02 0000 (0000011) 9.05
(0000104) 9.03 11 (0000102) 9.02
(0000100) 9.05 05 (0000105) 9.04 (0001000) 9.07 (0000203) 9.00
(0000125) 9.12 100 (0000123) 9.11
(0000127) 9.13 200 (0000130) 9.15
(0000133) 8.01 2000 (0000123) 9.11
(0000130) 8.02 201 (0000130) 9.15
(0000140) 8.03 252 (0000102) 9.02
(0000142) 8.04 21 (0000140) 8.03
(0000140) 8.05 06 (0000144) 8.05 (0000274) 10.02 (0000277) 10.03
(0000102) 8.13 210 (0000160) 8.12
(0000104) 8.14 220 (0000167) 8.16
(0000100) 7.01 2200 (0000100) 8.12
(0000171) 7.02 221 (0000167) 8.16
(0000175) 7.03 252 (0000140) 8.03
(0000177) 7.04 31 (0000175) 7.03
(0000101) 7.05 07 (0000170) 7.05 (0000200) 10.05 (0000201) 10.06
(0000100) 7.13 230 (0000100) 7.12
(0000200) 7.14 240 (0000203) 7.16
(0000205) 8.01 2400 (0000100) 7.12
(0000207) 8.02 241 (0000203) 7.16
(0000211) 8.03 252 (0000175) 7.03
(0000213) 8.04 0000 (0000211) 8.03
(0000217) 8.06 00 (0000215) 8.05 (0000302) 11.01
(0000220) 8.00 0000 (0000211) 8.03
(0000250) 8.00 0011 (0000223) 8.00
(0000240) 9.01 0025 (0000227) 8.10 (0000314) 11.04
(0000231) 9.02 0012 (0000223) 8.00
(0000240) 9.03 32 (0000230) 2.13
(0000240) 9.04 73 (0000230) 2.13
(0000243) 9.05 74 (0000230) 2.13
(0000250) 9.00 75 (0000230) 2.13
(0000250) 9.07 750
(0000252) 9.00 751 (0000250) 9.00
(0000272) 10.01 76 (0000230) 2.13
(0000273) 10.02 760
(0000275) 10.03 761 (0000272) 10.01
(0000300) 10.04 77 (0000230) 2.13
(0000277) 10.05 770
(0000200) 10.06 771 (0000200) 10.04
(0000300) 11.01 70 (0000230) 2.13
(0000304) 11.02 70 (0000230) 2.13
(0000300) 11.03 00 (0000230) 2.13

CARD ID PAGE/BOX NAME REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)

(0003120) 11.04 01 (0002201 8.13

CHART TITLE - NON-PROCEDURAL STATEMENTS

LOCATION		DIAGNOSTIC
CARD ID	PAGE/SEQ	
[illegible]	0.01	UNDEFINED - 'OPENIO' EXTERNAL REFERENCE
[illegible]	2.07	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	3.01	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	3.04	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	3.08	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	4.01	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	4.05	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	5.01	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	5.06	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	5.07	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
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[illegible]	6.02	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
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[illegible]	6.15	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.01	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.02	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.07	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.08	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.09	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.10	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.13	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.14	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	7.15	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	8.01	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	8.02	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	8.06	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	8.07	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE
[illegible]	8.01	UNDEFINED - 'OVERLAY' EXTERNAL REFERENCE

CHART TITLE - INTRODUCTORY COMMENTS

```
**********************************************************************
                          PROGRAM SLAVE0
**********************************************************************
```

```
***RADS STORAGE FILE 1 WITH 200 RECORDS MAX***
```

CHART TITLE - PROCEDURES

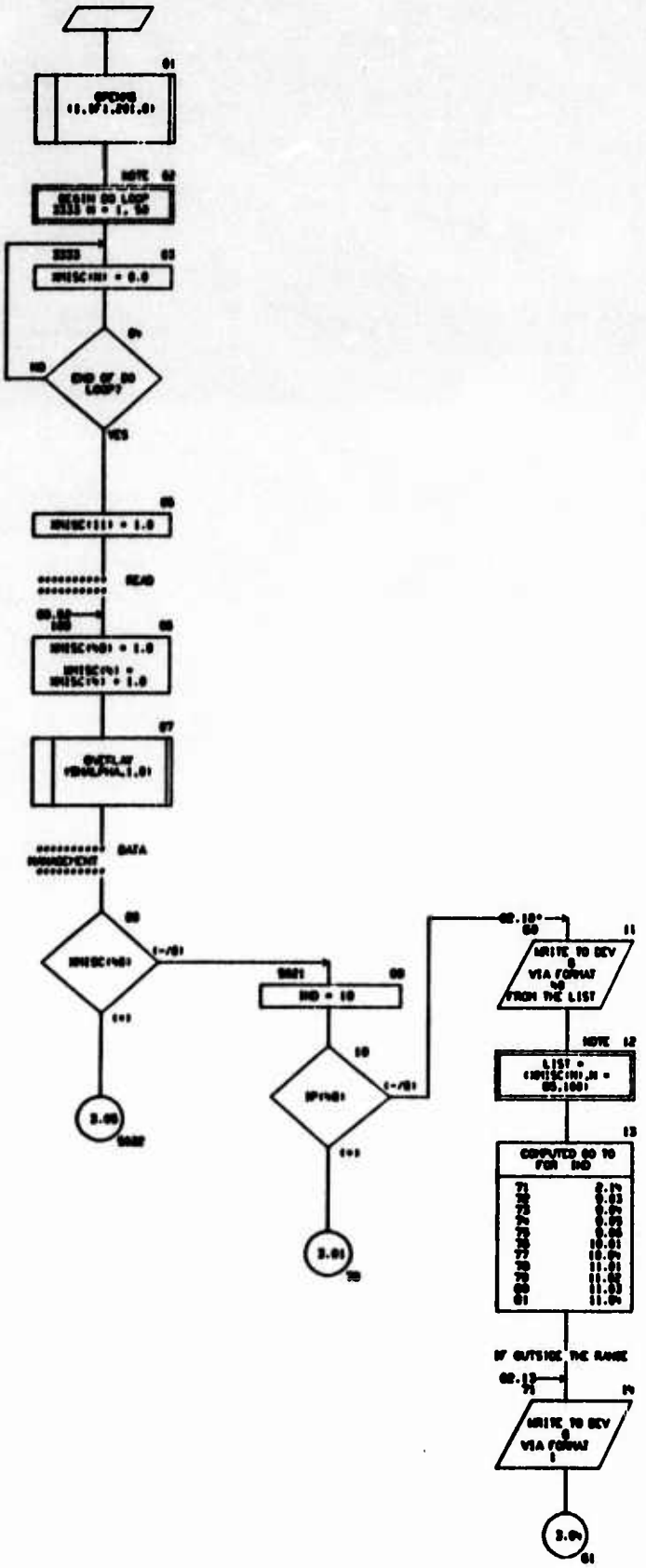


CHART TITLE - PROCEDURES

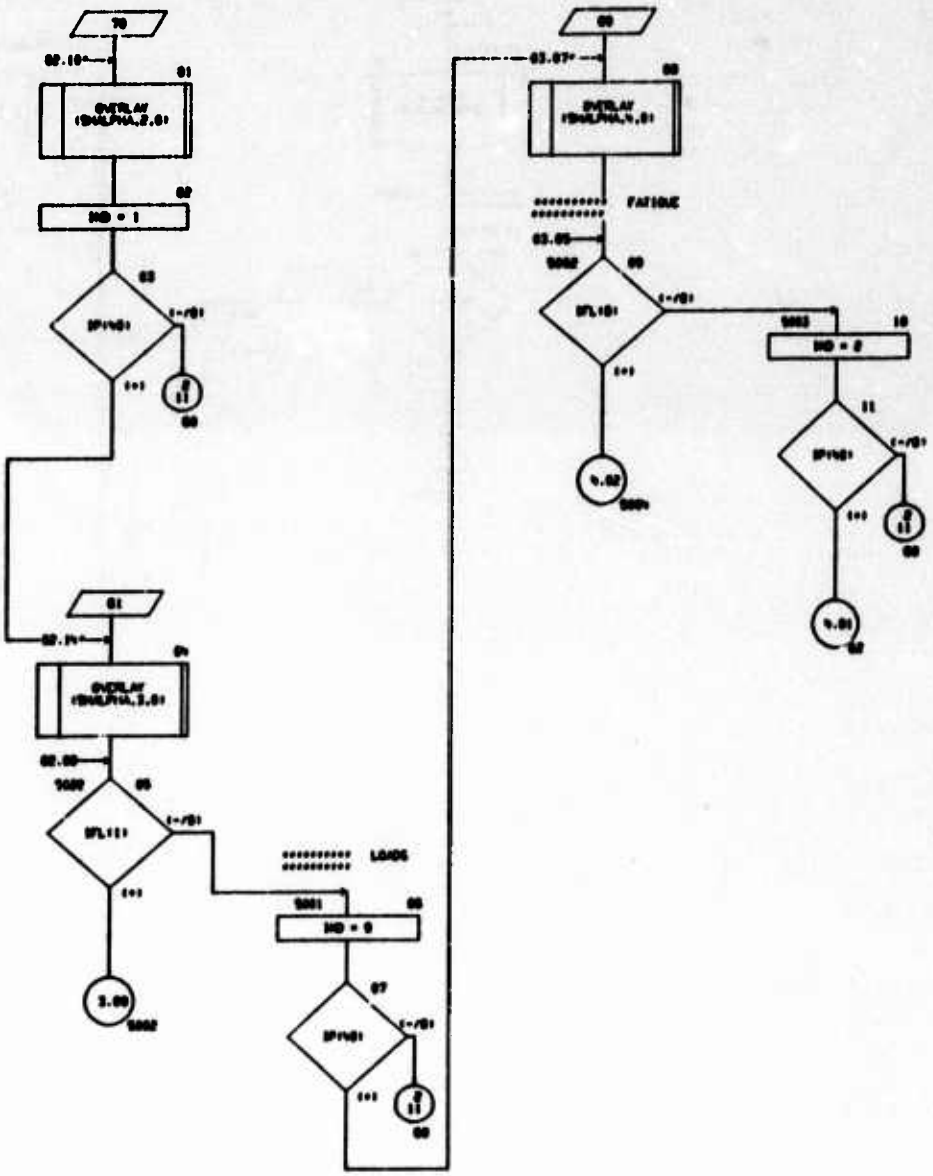
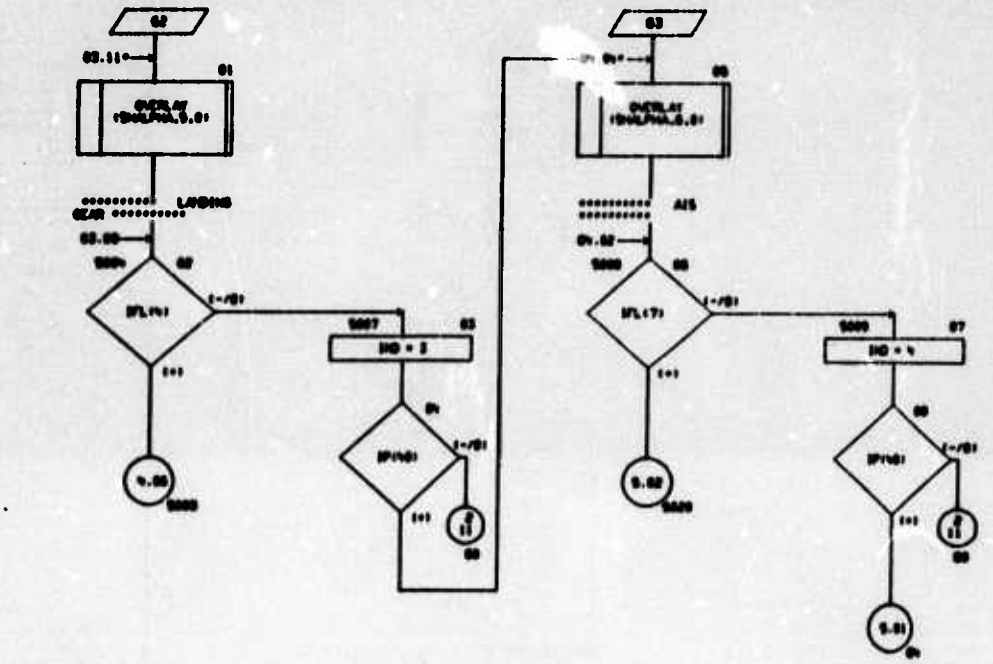


CHART TITLE - PROCEDURES



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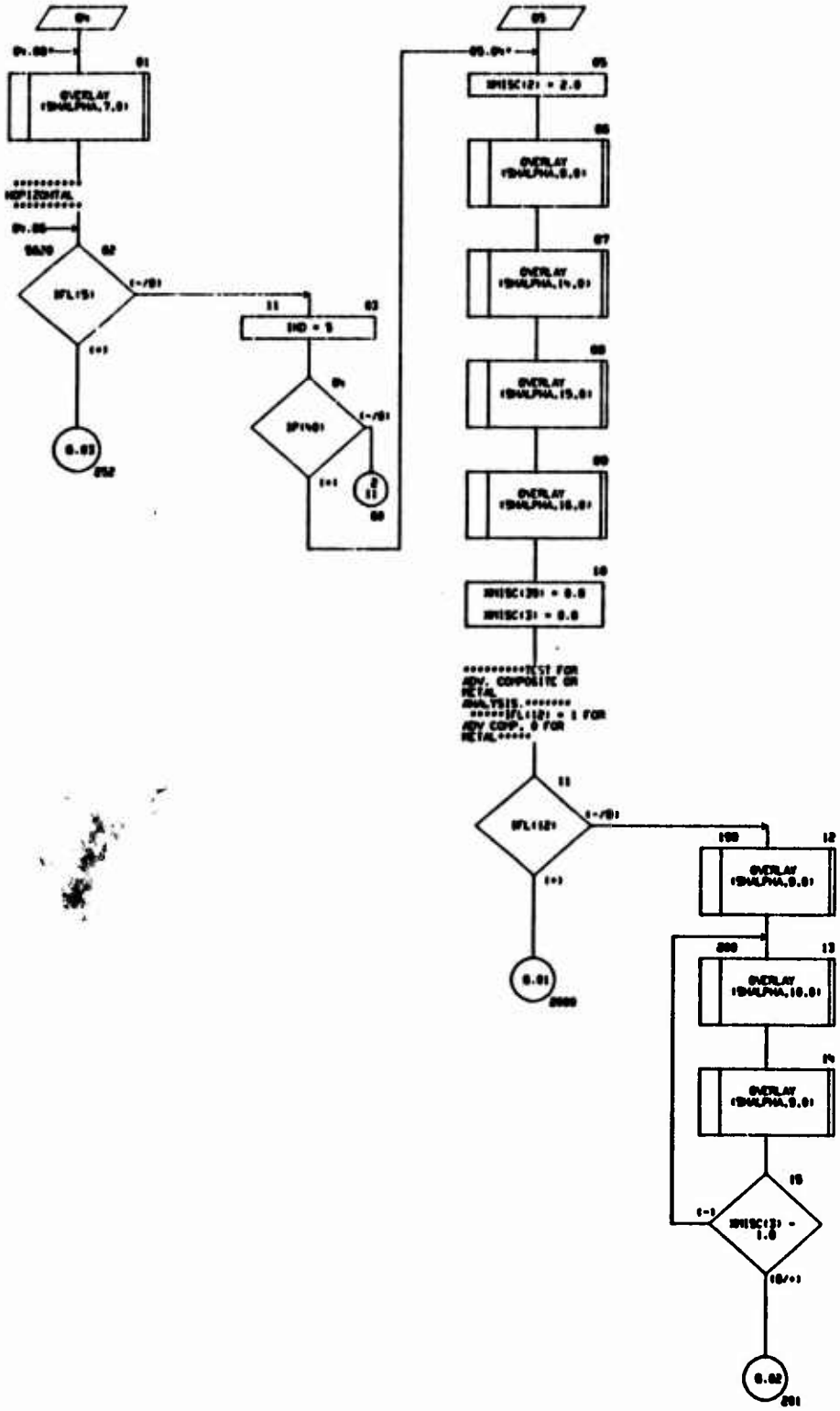
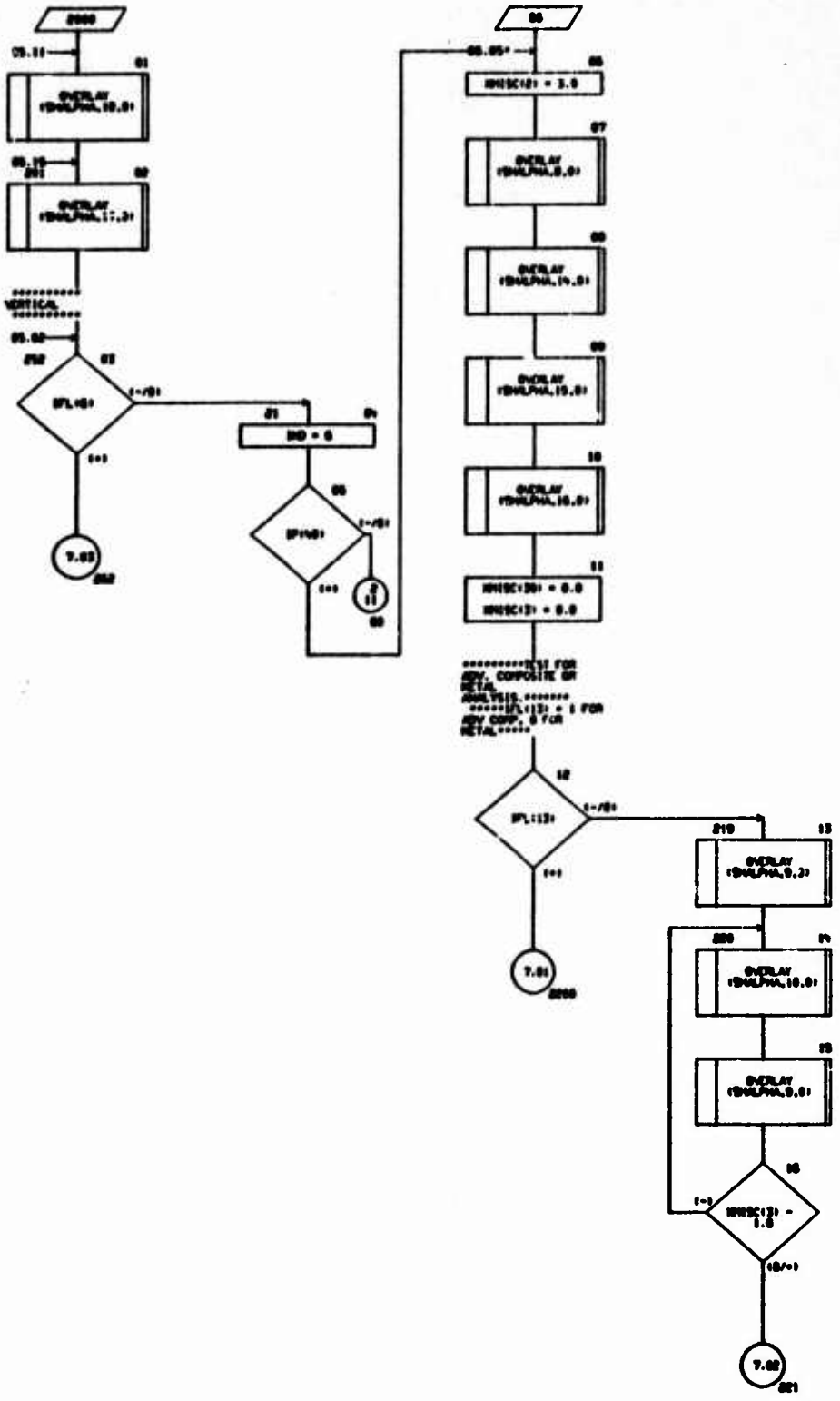


CHART TITLE - PROCEDURES



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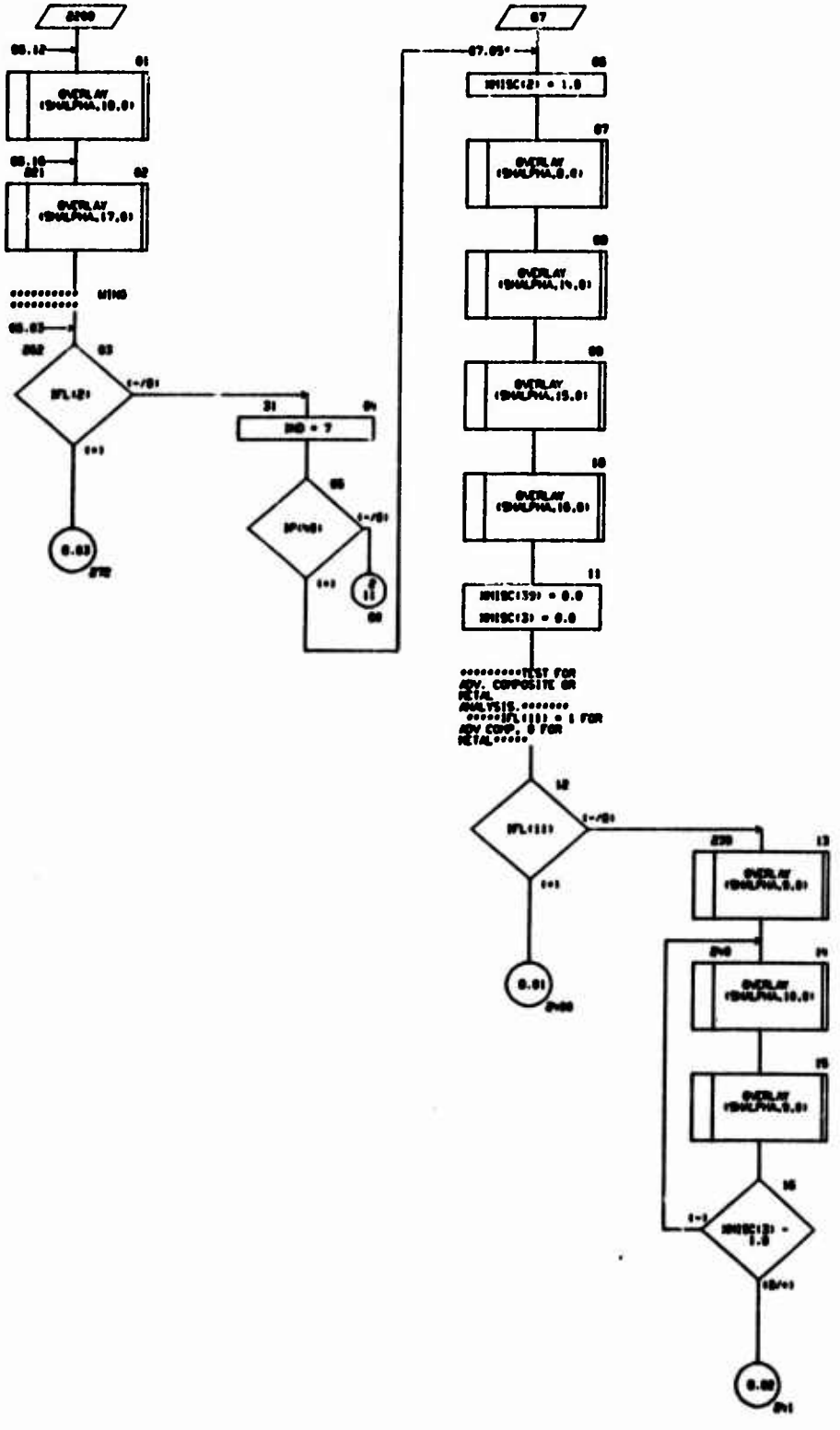


CHART TITLE - PROCEDURES

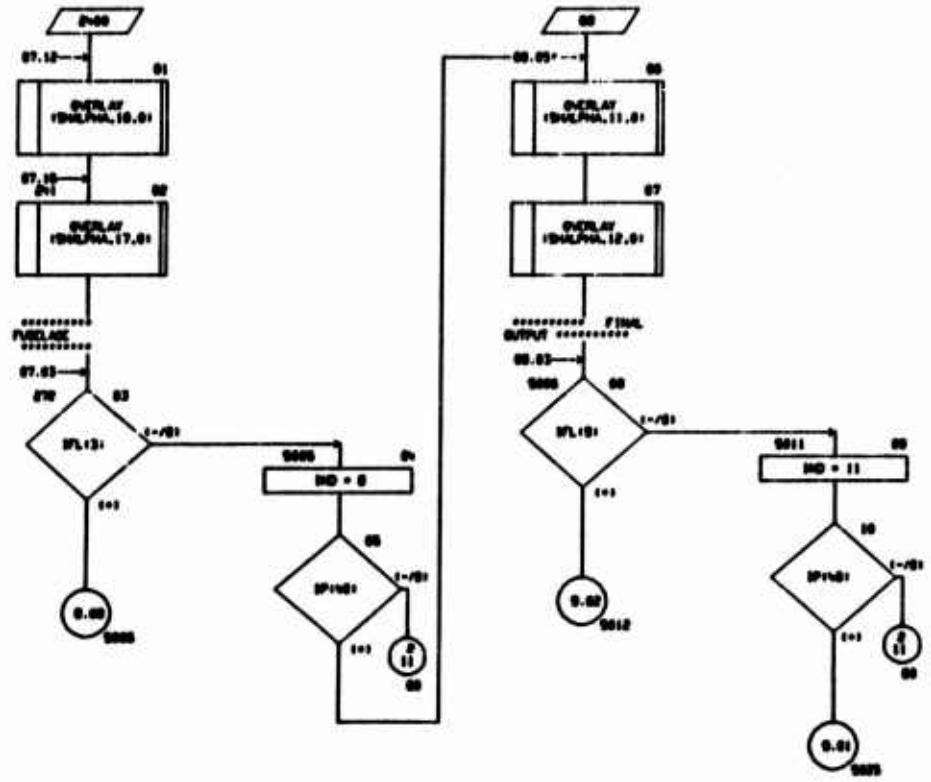


CHART TITLE - PROCEDURES

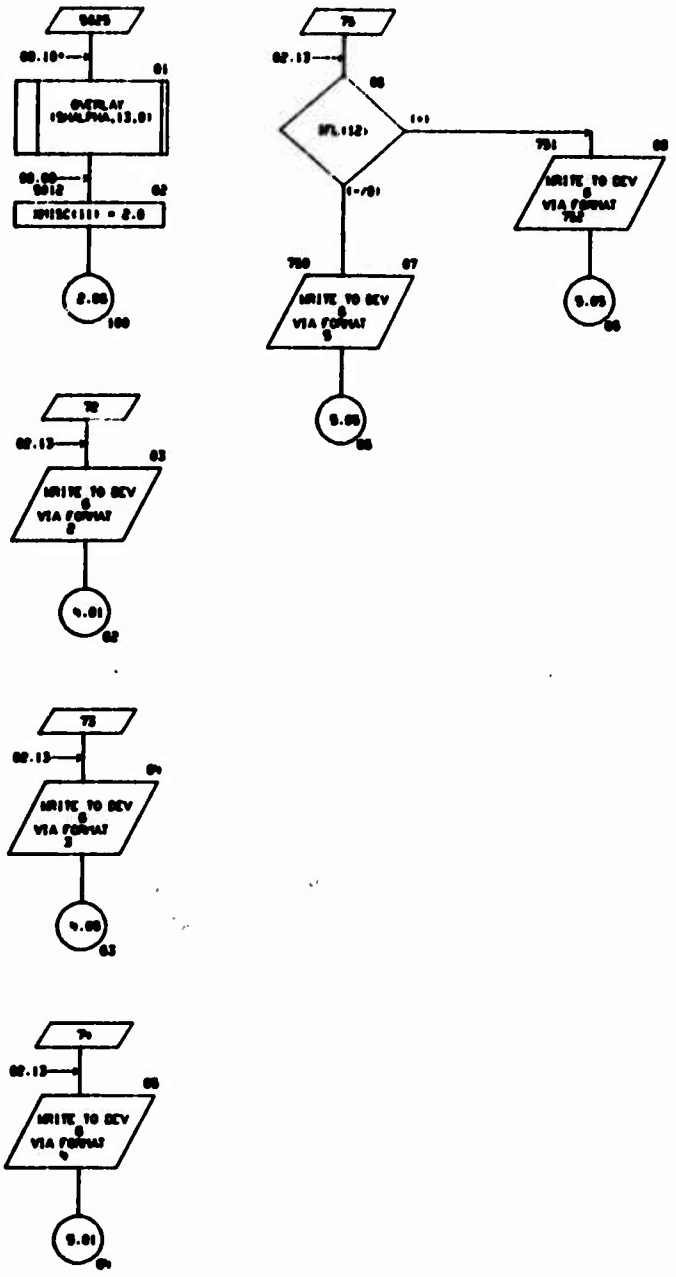


CHART TITLE - PROCEDURES

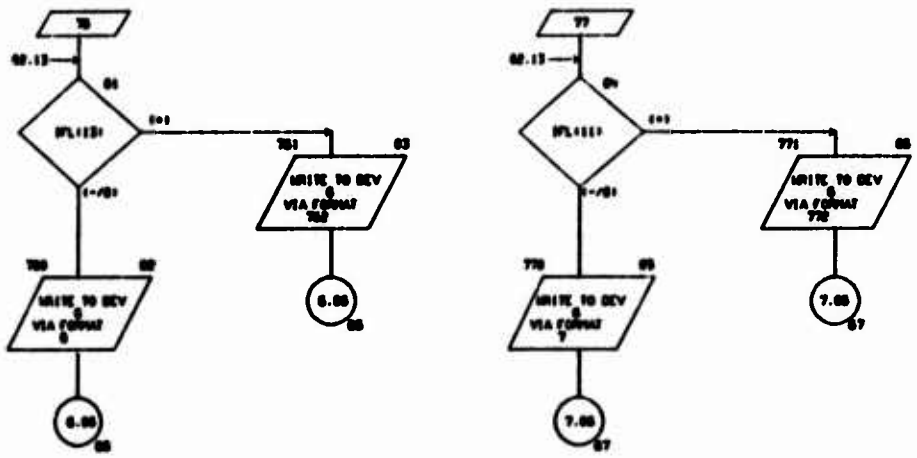
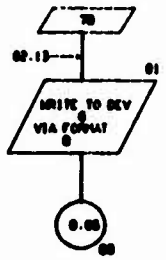
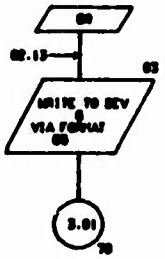


CHART TITLE - PROCEDURES





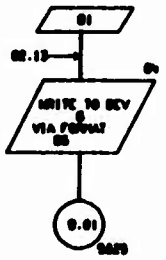


CHART TITLE - NON-PROCEDURAL STATEMENTS

```
          PROGRAM OLAY00(INPUT=512,OUTPUT=512,TAPE5=INPUT,TAPE6=OUTPUT,
           TAPE1=0,TAPE2=0,TAPE7=0,PUNCH=0)
          COMMON /MISC/ XMISC(100)
          COMMON /IPRINT/IP(80)
          COMMON /FDATT/ FDAT(60)
          COMMON /IFLOW/ IFL(13)
          DIMENSION   IF1(20)
          DATA XMISC(82)/4HWING/ , XMISC(83)/4HI.T./ , XMISC(84)/4HV.T./
          DATA XMISC(70)/10HGENERAL    / , XMISC(71)/10HWING       / ,
               XMISC(72)/10HHORIZONTAL/ , XMISC(73)/10HVERTICAL  / ,
               XMISC(74)/10HFUSELAGE  / , XMISC(75)/10HLG        / ,
               XMISC(76)/10HAIS       / , XMISC(77)/10HFATIGUE   / ,
               XMISC(78)/10HWV LOADS / , XMISC(79)/10HFUS LOADS / ,
               XMISC(80)/10HINERTIA   / , XMISC(81)/1C EXECUTE    /
 40       FORMAT(////1H1,8A10,8X,21H** OLAY00 - IP(40) **/1H ,8A10///)
 1        FORMAT(10X,70H**** VF PARAMETER CURVES, STRESS AND G CURVES, TEMPE
          RATURES (OVERLAY 3) ****////)
 2        FORMAT(20X,35H**** F A T I G U E (OVERLAY 5) ****////)
 3        FORMAT(20X,44H**** L A N D I N G  G E A R (OVERLAY 6) ****////)
 4        FORMAT(20X,42H**** AIR INDUCTION SYSTEM (OVERLAY 7) ****////)
 5        FORMAT (20X,82H**** H O R I Z O N T A L -- METAL DESIGN - (OVERLAY
          S 8, 14, 15, 16, 9, 10 AND 17) ****////)
 752      FORMAT (20X,82H**** H O R I Z O N T A L -- ADV. COMPOSITE DESIGN -
           (OVERLAYS 8, 14, 15, 16, 10 AND 17) ****////)
 6        FORMAT (20X,82H**** V E R T I C A L -- METAL DESIGN - (OVERLAYS 8,
           14, 15, 16, 9, 10 AND 17) ****////)
 762      FORMAT (20X,80H**** V E R T I C A L -- ADV. COMPOSITE DESIGN - (OV
          ERLAYS 8, 14, 15, 16, 10 AND 17) ****////)
 7        FORMAT (20X,74H**** W I N G -- METAL DESIGN - (OVERLAYS 8, 14, 15,
           16, 9, 10 AND 17) ****////)
 772      FORMAT (20X,83H**** W I N G -- ADV. COMPOSITE DESIGN - (OVERLAYS 8
          , 14, 15, 16, 10 AND 17) ****////)
 8        FORMAT(20X,48H**** F U S E L A G E (OVERLAYS 11 AND 12) ****////)
 9        FORMAT(20X,31H**** L O A D S (OVERLAY 4) ****////)
 88       FORMAT(20X,37H**** DATA MANAGEMENT (OVERLAY 2) ****////)
 85       FORMAT(20X,35H**** FINAL OUTPUT (OVERLAY 13) ****////)
```

FORTRAN MODULE (LIST,AUTOSEQ)

CARD NO **** CONTENTS ****

```
C
C ******************************************************************************
C                              PROGRAM OLAY00
C ******************************************************************************
C
      PROGRAM OLAY00(INPUT=512,OUTPUT=512,TAPE5=INPUT,TAPE6=OUTPUT,
     * TAPE1=0,TAPE2=0,TAPE7=0,PUNCH=0)
C
      COMMON /MISC/ XMISC(100)
C
      COMMON /IPRINT/IP(80)
C
      COMMON /FDATT/ FDAT(60)
C
      COMMON /IFLOW/ IFL(13)
C
      DIMENSION IF1(201)
C
      DATA XMISC(2)/6HSWING/ , XMISC(3)/4H.T./ , XMISC(4)/4HV.T./
C
      DATA XMISC(70)/10HGENERAL   / , XMISC(71)/10HWING      /,
     *     XMISC(72)/10HHORIZONTAL/ , XMISC(73)/10HVERTICAL  /,
     *     XMISC(74)/10HFUSELAGE  / , XMISC(75)/10HLG        /,
     *     XMISC(76)/10HAIS       / , XMISC(77)/10HFATIGUE   /,
     *     XMISC(78)/10HW LOADS   / , XMISC(79)/10HFUS LOADS /,
     *     XMISC(80)/10HINERTIA   / , XMISC(81)/10HEXECUTE   /
C
C           ***MASS STORAGE FILE 1 WITH 200 RECORDS MAX***
      CALL OPENMS(1,IF1,201,0)
C
      DO 3333 N=1,50
 3333 XMISC(N) = 0.0
      XMISC(11) = 1.0
C
C     **********  READ        **********
C
  100 XMISC(40) = 1.0
      XMISC(4) = XMISC(4) + 1.0
C
      CALL OVERLAY(5HALPHA,1,0)
C
C     **********  DATA MANAGEMENT   **********
C
      IF(XMISC(40))9021,9021,9022
C
 9021 NO = 10
C
      IF(IP(NO))60,60,70
C
   70 CALL OVERLAY(5HALPHA,2,0)
C
      NO = 1
C
      IF(IP(NO))60,60,61
C
   61 CALL OVERLAY(5HALPHA,3,0)
C
 9022 IF(IFL(1))9001,9001,9002
C
C     **********  LOADS       **********
C
 9001 NO = 9
C
      IF(IP(NO))60,60,80
C
   80 CALL OVERLAY(5HALPHA,4,0)
C
C     **********  FATIGUE     **********
C
 9002 IF(IFL(8))9003,9003,9004
```

CARD NO **** CONTENTS ****

```
C
 5003 NO = 2
C
      IF(IP(NO))60,60,62
C
   62 CALL OVERLAY(SHALPHA,5,0)
C
C       **********  LANDING GEAR **********
C
 5004 IF(IFL(4))5007,5007,5008
C
C
 5007 NO = 3
C
      IF(IP(NO))60,60,63
C
   63 CALL OVERLAY(SHALPHA,6,0)
C
C       **********  AIS          **********
C
 5008 IF(IFL(7))5009,5009,5020
C
 5009 NO = 4
C
      IF(IP(NO))60,60,64
:
   64 CALL OVERLAY(SHALPHA,7,0)
C
C
C       **********  HORIZONTAL   **********
C
 5020 IF(IFL(5))11,11,252
C
   11 NO = 5
C
      IF(IP(NO))60,60,65
C
   65 XMISC(2) = 2.0
C
      CALL OVERLAY(SHALPHA,8,0)
C
      CALL OVERLAY (SHALPHA,14,0)
C
      CALL OVERLAY (SHALPHA,15,0)
C
      CALL OVERLAY (SHALPHA,16,0)
C
      XMISC(30) = 0.0
      XMISC(3) = 0.0
C
C**********TEST FOR ADV. COMPOSITE OR METAL ANALYSIS.*******
C       *****IFL(12) = 1 FOR ADV COMP, 0 FOR METAL*****
      IF (IFL(12)) 100,100,2000
C
  100 CALL OVERLAY(SHALPHA,9,0)
C
  200 CALL OVERLAY(SHALPHA,10,0)
      CALL OVERLAY(SHALPHA,9,0)
C
      IF (XMISC(3) - 1.0) 200,201,201
C
C
 2000 CALL OVERLAY(SHALPHA,10,0)
C
  201 CALL OVERLAY (SHALPHA,17,0)
C
C
C       **********  VERTICAL     **********
C
  252 IF(IFL(6))21,21,252
C
```

CARD NO **** CONTENTS ****

```
   21 IND = 6
C
      IF(IP(6))00,00,06
C
   06 XMISC(2) = 3.0
      CALL OVERLAY(SHALPHA,8,0)
C
      CALL OVERLAY (SHALPHA,14,0)
C
      CALL OVERLAY (SHALPHA,15,0)
C
      CALL OVERLAY (SHALPHA,16,0)
C
      XMISC(30) = 0.0
      XMISC(3) = 0.0
C
C**********TEST FOR ADV. COMPOSITE OR METAL ANALYSIS.*******
C        *****IFL(13) = 1 FOR ADV COMP, 0 FOR METAL*****
      IF (IFL(13)) 210,210,2200
C
  210 CALL OVERLAY(SHALPHA,9,0)
C
  220 CALL OVERLAY(SHALPHA,10,0)
      CALL OVERLAY(SHALPHA,9,0)
C
      IF (XMISC(3) - 1.0) 220,221,221
C
 2200 CALL OVERLAY(SHALPHA,10,0)
C
  221 CALL OVERLAY (SHALPHA,17,0)
C
C        **********  WING        **********
C
  222 IF(IFL(2))31,31,272
C
   31 IND = 7
C
      IF(IP(6))00,00,07
C
   07 XMISC(2) = 1.0
C
      CALL OVERLAY(SHALPHA,8,0)
C
      CALL OVERLAY (SHALPHA,14,0)
C
      CALL OVERLAY (SHALPHA,15,0)
C
      CALL OVERLAY (SHALPHA,16,0)
C
      XMISC(30) = 0.0
      XMISC(3) = 0.0
C
C**********TEST FOR ADV. COMPOSITE OR METAL ANALYSIS.*******
C        *****IFL(11) = 1 FOR ADV COMP, 0 FOR METAL*****
      IF (IFL(11)) 230,230,2400
C
  230 CALL OVERLAY(SHALPHA,9,0)
C
  240 CALL OVERLAY(SHALPHA,10,0)
      CALL OVERLAY(SHALPHA,9,0)
C
      IF (XMISC(3) - 1.0) 240,241,241
C
 2400 CALL OVERLAY(SHALPHA,10,0)
C
  241 CALL OVERLAY (SHALPHA,17,0)
C
C        **********  FUSELAGE    **********
C
  272 IF(IFL(3))5000,5000,5000
C
```

CARD NO **** CONTENTS ****

```
 9000 IND = 0
C
      IF(IP(40))60,60,60
C
   60 CALL OVERLAY(6HALPHA,11,0)
C
      CALL OVERLAY(6HALPHA,12,0)
C
C     **********  FINAL OUTPUT **********
C
 9006 IF(IFL(9))9011,9011,9012
C
 9011 IND = 11
C
      IF(IP(40))60,60,9025
C
 9025 CALL OVERLAY(6HALPHA,13,0)
C
 9012 XMISC(11) = 2.0
C
      GO TO 100
C
   60 WRITE(6,40)(XMISC(N),N=83,100)
   40 FORMAT(////1H1,8A10,8X,21H** OLAY80 - IP(40) **/1H ,8A10///)
C
      GO TO(71,72,73,74,75,76,77,78,79,80,81),IND
C
   71 WRITE(6,1)
    1 FORMAT(10X,70H**** V-N PARAMETER CURVES, STRESS AND G CURVES, TEMPE
     1RATURES (OVERLAY 3) ****////)
      GO TO 61
C
   72 WRITE(6,2)
    2 FORMAT(20X,33H**** F A T I G U E (OVERLAY 5) ****////)
      GO TO 62
C
   73 WRITE(6,3)
    3 FORMAT(20X,44H**** L A N D I N G  G E A R (OVERLAY 6) ****////)
      GO TO 63
C
   74 WRITE(6,4)
    4 FORMAT(20X,42H**** AIR INDUCTION SYSTEM (OVERLAY 7) ****////)
      GO TO 64
C
C
 75   IF (IFL(12)) 750,750,751
 750  WRITE (6,5)
      GO TO 65
C
 751  WRITE (6,752)
      GO TO 65
C
    5 FORMAT (20X,85H**** H O R I Z O N T A L -- METAL DESIGN - (OVERLAY
     1S 8, 14, 15, 16, 9, 10 AND 17) ****////)
C
 752  FORMAT (20X,92H**** H O R I Z O N T A L -- ADV. COMPOSITE DESIGN -
     1 (OVERLAYS 8, 14, 15, 16, 10 AND 17) ****////)
C
C
 76   IF (IFL(13)) 760,760,761
 760  WRITE (6,6)
      GO TO 66
C
 761  WRITE (6,762)
      GO TO 66
C
    6 FORMAT (20X,80H**** V E R T I C A L -- METAL DESIGN - (OVERLAYS 8,
     1 14, 15, 16, 9, 10 AND 17) ****////)
C
 762  FORMAT (20X,88H**** V E R T I C A L -- ADV. COMPOSITE DESIGN - (OV
     1ERLAYS 8, 14, 15, 16, 10 AND 17) ****////)
```

CARD NO **** CONTENTS ****

```
C
C
 77   IF (IFL(1)) 770,770,771
 770  WRITE (6,7)
      GO TO 67
C
 771  WRITE (6,772)
      GO TO 67
C
    7 FORMAT (20X,74H**** W I N G -- METAL DESIGN - (OVERLAYS 8, 14, 15,
     1 16, 9, 10 AND 17) ****/////)
C
 772  FORMAT (20X,80H**** W I N G -- ADV. COMPOSITE DESIGN - (OVERLAYS 8
     1, 14, 15, 16, 10 AND 17) ****/////)
C
C
   78 WRITE(6,8)
    8 FORMAT(20X,48H**** F U S E L A G E (OVERLAYS 11 AND 12) ****/////)
      GO TO 88
C
   79 WRITE(6,9)
    9 FORMAT(20X,31H**** L O A D S (OVERLAY 4) ****/////)
      GO TO 88
C
   88 WRITE(6,85)
   85 FORMAT(20X,37H**** DATA MANAGEMENT (OVERLAY 2) ****/////)
      GO TO 79
C
   81 WRITE(6,86)
   86 FORMAT(20X,38H**** FINAL OUTPUT (OVERLAY 13) ****/////)
      GO TO 9875
C
C
      END
```

Section V

INPUT DATA PROCESSING MODULE

PROGRAM DESCRIPTION

The function of the input data processing module is to read the input data and in itialize the problem. This module consists of a main program, READ, and two relative address read routines, DECRD and DECRD7. DECRD is used to read the relative address format input cards, and DECRD7 is used to read permanent data bank records from TAPE7. CDC system routines READMS and WRITMS are used to read and write mass storage file records.

GENERAL MAPS

Data storage and transmittal are accomplished through the use of blank common, labeled common, and mass storage file records. Temporary data arrays GDSAVE and ND are stored in the program region of READ. Blank common is used to read and write data records. Location in common is supplied as an argument to the read routines DECRD, DECRD7, and READMS, and to the write routine WRITMS by the control program. Variables in blank common are dependent on the processing sequence of data records.

Labeled common blocks IPRINT, IFLOW, MISC, and FDATT are used in this module. The FDATT block, which is used to store weight summary data from the weight analysis modules, is cleared in the initialization phase of program operation.

PROGRAM READ

General Description

Deck name:	READ
Entry name:	OVERLAY (5HALPHA, 1, 0)
Called by:	OLAY00
Subroutines called:	DECRD, DECRD7

Two operations are performed in this routine. The first process consists of mass storage file record initialization. The second process consists of case design data processing.

This routine is presented a control indicator, XMISC(11), which indicates whether the problem case is the first case (XMISC(11) = 1.0) or a subsequent case (XMISC(11) = 2.0) of a problem run. For either situation, input case data deck title cards and the two case control cards are read. Data in the control cards are organized in labeled common arrays, IP (IPRINT block), IFL (IFLOW block), and XMISC (MISC block), as shown in Tables 3 and 4.

A file initialization indicator, IFL(10), is obtained from case control card 2.

IFL(10) = 0 indicates leave files as they exist and update with input data

IFL(10) = 1 indicates reinitialize data files

Mass storage file records are initialized for the first problem case (XMISC(11) = 1.0) or, for a subsequent case, with IFL(10) = 1. For subsequent cases where IFL(10) = 0, the file initialization procedure is bypassed. Mass storage file records which are defined in this module are shown in Table 10.

Initialization of Mass Storage File Records

Certain mass storage file records are initialized from TAPE7 records as shown in Figure 4 and Table 10. DECRD7 is used to read numeric data from TAPE7.

The first nine records on TAPE7 are read by DECRD7 and written in mass storage file records 1 through 9 for use by the airloads module.

The next record on TAPE7 consists of wing permanent data which are used to initialize mass storage file record 23. The next two TAPE7 records consist of changes to the wing permanent data for the horizontal and vertical tails, respectively. Mass storage file records 26 and 27 are initialized by modification of record 23.

The next two TAPE7 records are used to initialize mass storage file records 24 and 25.

The following record on TAPE7 consists of alphanumeric ramp titles and numeric data. Ramp titles are read into data locations (common) 771 through 1700, numeric data are then read, and the combined information is used to initialize file record 28.

TABLE 10. MASS STORAGE FILE RECORD ORGANIZATION IN INPUT DATA PROCESSING MODULE

Record No.	Array Name and Size	Initialization Source or Value	Update Data Source	Description
1	D(56)	TAPE7		Aerodynamic data (refer to Vol III)
2	D(853)	TAPE7		Subsonic aerodynamic data (refer to Vol III)
3	D(146)	TAPE7		Deflected flap data (refer to Vol III)
4	D(734)	TAPE7		Supersonic aerodynamic data (refer to Vol III)
5	D(288)	TAPE	"GENERAL"	Blocked mission segment data (refer to Vol III)
6	D(340)	TAPE7		Maneuver load factor spectra data (refer to Vol III)
7	D(60)	TAPE7		Taxi load factor spectra data (refer to Vol III)
8	D(72)	TAPE7		Turbulence field parameters (refer to Vol III)
9	D(109)	TAPE7		Gust response factors (refer to Vol III)
11	D(1606)	TAPE7	"GENERAL"	Design data for data management module
12	D(312)	TAPE7		Flutter and temperature data (refer to Vol IV)
17	RATIO(264)	1.0		Loads normalizing factors (refer to Vol III)
21	D(200)	0.0		Wing and empennage design data (refer to Vol VI)
23	D(2060)	TAPE7	"WING"	Wing design data (refer to Vol VI)
24	D(2000)	TAPE7	"GENERAL" "FUSELAGE"	Fuselage design data (refer to Vol VII)
25	D(116)	TAPE7	"LG"	Landing gear design data (refer to Vol V)
26	D(2060)	TAPE7	"HORIZONTAL"	Horizontal tail design data (refer to Vol VI)
27	D(2060)	TAPE7	"VERTICAL"	Vertical tail design data (refer to Vol VI)
28	D(2000)	TAPE7	"GENERAL" "AIS"	Air induction system, nacelle, and engine section design data (refer to Vol V)
29	D(2400)	0.0	"FATIGUE"	Fatigue evaluation data (refer to Vol IV)
32	D(198)	0.0	"WHV LOADS"	Wing and empennage loads data (refer to Vol III)
33	D(672)	0.0	"FUS LOADS"	Fuselage loads data (refer to Vol III)
34	D(480)	0.0	"INERTIA"	Vehicle weight distribution (refer to Vol VII)
35	DUMMY(830)		"FATIGUE"	Wing bending moment spectra (refer to Vol IV)
36	D(500)	TAPE7		Airfoil data (refer to Vol VI)
37	D(100	TAPE7		T-tail flutter constants (refer to Vol VI)
38	D(50)	0.0		Surface flutter data (refer to Vol IV)
41-60	TMF(300)	TAPE7		Material properties data (refer to Vol IV)

Mass storage file records 12, 11, 36, and 37 are initialized from numeric data in the following four TAPE7 records.

The remainder of TAPE7 records are material properties library data. Each of these records consist of two title cards, followed by numeric data. As many as 20 different material records may be stored on TAPE7. Alphanumeric information from the title cards are combined with the numeric data to create mass storage file records 41 through 60. A count of the number of different materials is kept in XMISC(1). Two blank cards, followed by a numeric card with 0.0 in relative address location 1, designate termination of material records on TAPE7.

Mass storage file records 17, 21, 29, 32, 33, 34, and 38 are also initialized. Variables in file record 17 are initialized at 1.0; variables in the other records are set at 0.0. Labeled common block FDATT is also set to 0.0 in the initialization procedure.

Case Design Data Processing

Any number of design data decks may exist in a given problem case. Each of the decks are identified by a unique alphanumeric name which precedes the numeric data. A comparative test between the design data deck title and preprogrammed names in the labeled common block MISC is used to identify each deck. The alphanumeric name "EXECUTE" is used to terminate reading of design data and to return to OLAY00. The integer counter (IND), preprogrammed deck names, and their labeled common locations are shown in Table 11.

Primary function of each of the design data decks is to update the appropriate mass storage file record as shown in Table 11. The "GENERAL" and "FATIGUE" design data decks are also used to create or update other file records.

The "GENERAL" data deck is used to update record 11. Certain data in this record are identical to data in the "FUSELAGE" and "AIS" data decks. Therefore, the duplicated data are reorganized and used to update records 24 through 28 as shown in Table 12. Wing and empennage chords at the fuselage-to-surface intersection station (Table 12) are calculated from "GENERAL" design data and stored in file record 24. Surface root chord is calculated by equation 1.

$$C_R = \frac{2\sqrt{\frac{S}{AR}}\ (12)}{(1 + \lambda)} \qquad (1)$$

TABLE 11. INPUT DESIGN DATA DECK IDENTIFICATION

Counter IND	Alphanumeric Deck Name	XMISC Loc	Principle File Record No.	Description
1	"GENERAL"	70	11	Design data deck for data management module
2	"WING"	71	23	Design data deck for wing analysis
3	"HORIZONTAL"	72	26	Design data deck for horizontal tail analysis
4	"VERTICAL"	73	27	Design data deck for vertical tail analysis
5	"FUSELAGE"	74	24	Design data deck for fuselage analysis
6	"LG"	75	25	Design data deck for landing gear analysis
7	"AIS"	76	28	Design data deck for air induction system, nacelle, and engine section analysis
8	"FATIGUE"	77	29	Design data deck for fatigue analysis
9	"WHV LOADS"	78	32	Input loads for wing, horizontal tail, and vertical tail analysis
10	"FUS LOADS"	79	33	Input loads data for fuselage analysis
11	"INERTIA"	80	34	Input vehicle weight distributions and inertia for fuselage analysis
12	"EXECUTE"	81		End of case data instruction

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
1	1081	243		Fuselage perimeter code 1 = perimeter input 2 = perimeter correction factor input
2	1082	242		Number of fuselage synthesis cuts
3	701	241		Vehicle class 11.0 = fighters and attack 21.0 = bombers 31.0 = transports for wheeled vehicles heavier than 100K 32.0 = transports for wheeled vehicles lighter than 100K 33.0 = transports for bulk cargo heavier than 100K 34.0 = transports for bulk cargo lighter than 100K 35.0 = transports for personnel heavier than 100K 36.0 = transports for personnel lighter than 100K
4-13	1086-1095	291-300		X-station of 10 fuselage geometry cuts, in.
4-23	1096-1105	301-310		Z-station of fuselage half-depth at 10 geometry cuts, in.
24-33	1106-1115	311-320		Fuselage depth at 10 geometry cuts, in.
34-43	1116-1125	321-330		Fuselage width at 10 geometry cuts, in.
44-53	1126-1135	331-340		Fuselage perimeter or perimeter correction factor at 10 geometry cuts

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONT)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
54-72	1136-1154	361-379		X-station of fuselage synthesis cuts, in.
73	735		316	Pitching acceleration at limit speed, rad/sec^2
74	731		317	Maximum positive maneuver load factor
75	1202		321	Number of duct cuts
76	1201		322	Duct perimeter code 1 = perimeter input 2 = perimeter correction factor input
77	1271		401	Number of two-dimensional inlet ramps
78	1287		417	Distance inlet leading edge to first ramp hinge, in.
79	1291		522	Nacelle perimeter code 1 = perimeter input 2 = perimeter correction factor input
80	1292		521	Number of nacelle cuts
81	1299		529	Nacelle maximum depth, in.
82	1300		530	Nacelle maximum width, in.
83	1161		281	Number of nacelles
84	1162		282	Engine bypass ratio

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONT)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
85	1163		283	Inlet type 1.0 = fixed duct 2.0 = fixed spike 3.0 = horizontal ramp 4.0 = vertical ramp 5.0 = translating spike 6.0 = translating and expanding spike
86	1164		284	Capture area per inlet, $in.^2$
87	1165		285	Number of inlets
88	1166		286	Distance, leading edge of inlet to throat, in.
89	1167		287	Number of engines per vehicle
90	1168		288	Maximum sea-level static thrust per engine, lb
91	1169		289	Weight per engine, lb
92	1170		290	Engine length, in.
93	1171		291	Engine maximum diameter, in.
94	1172		292	Distance from front face to engine center of gravity, in.
95	1173		293	X-station inlet leading edge of inboard engine package, in.
96	1174		294	Y-station inboard nacelle centerline at engine front face, in.
97	1175		295	Z-station inboard nacelle centerline at engine front face, in.
98	1176		296	X-station inlet leading edge of outboard engine package, in.

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONT)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
99	1177		297	Y-station outboard nacelle centerline at engine front face, in.
100	1178		298	Z-station outboard nacelle centerline at engine front face, in.
101	1179		299	Not used
102	1180		300	Pylon, sweep of leading edge, deg
103	1181		301	Pylon type of mounting 0.0 = vertical 1.0 = horizontal
104	1182		302	Pylon, chord of inboard, in.
105	1183		303	Pylon, span of inboard, in.
106	1184		304	Pylon, chord of outboard, in.
107	1185		305	Pylon, span of outboard, in.
108	1186		306	Pylon, thickness to chord ratio
109-118	1211-1220		331-340	X-station of duct cuts referenced from leading edge station, in.
119-128	1221-1230		341-350	Y-station at duct cuts, in. Distance from centerline of vehicle to centerline of duct for fuselage-buried engine concept, or distance from centerline of nacelle to centerline of duct for nacelle-mounted engine concept.
129-138	1241-1250		361-370	Duct depth at duct cuts, in.
139-148	1251-1260		371-380	Duct width at duct cuts, in.

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONT)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
149-158	1261-1270		381-390	Duct perimeter or perimeter correction factor at duct cuts
159-162	1274-1277		404-407	Two-dimensional inlet ramp lengths, in.
163-166	1278-1281		408-411	Two-dimensional inlet ramp widths, in.
167-176	1301-1310		531-540	X-station of nacelle cuts reference from leading edge station, in.
177-186	1331-1340		561-570	Nacelle depth at nacelle cuts, in.
187-196	1341-1350		571-580	Nacelle width at nacelle cuts, in.
197-206	1351-1360		581-590	Nacelle perimeter or perimeter correction factor at nacelle cuts
207-211	751-755		601-605	Level-flight maximum speed (M_H) on speed-altitude profile wing fixed or aft
212-216	756-760		606-610	Altitudes at M_H, ft
217-221	761-765		611-615	Increments from level-flight maximum speed to limit speed (M_L) 0.0 = use general increment <1.0 = decimal increment to add to M_H >1.0 = multiplier for M_H <0.0 = fraction of M_H to add to M_H
222-226	766-770		616-620	Inlet pressure recovery ratios at M_H
227-231	771-775		621-625	Inlet pressure recovery ratios at M_L

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONT)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
232-236	776-780		626-630	Airflow of engine at flight profile points, M
237	781		631	General increment from level-flight maximum speed to limit speed
238	782		632	General inlet pressure recovery ratio
239	1187		307	Auxiliary inlet door area per nacelle, ft^2
240	1188		308	Duct bypass door area per nacelle, ft^2
241	1189		309	Miscellaneous door area per nacelle, ft^2
242	1190		310	Shroud indicator 0.0 = no engine shroud 1.0 = engine shroud >1.0 = shroud area, ft^2
243	957	1005		Buttock line of wing to fuselage tie, in.
244	961	1006		Z-station of wing reference plane, in.
245	709	1007		Wing carry-thru structure indicator 0 = shear tie + = shear and moment tie
246[a]	1007	1010		Buttock line of horizontal to fuselage tie, in.
247[a]	1011	1011		Z-station of horizontal tail reference plane, in.

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONT)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
248[a]	704	1012		Horizontal-tail-type indicator 0.0 = shear tie slab tail 1.0 = shear and moment tie 2.0 = spindle mounted
249	1047	1015		Buttock of vertical tail root, in.
250	1051	1016		Z-station of vertical tail root, in.
251	705	1017		Vertical-tail-type indicator 0.0 = shear tie slab tail 1.0 = shear and moment tie 2.0 = spindle mounted
252	747	1026		Nose gear center-of-axle X-station in extended position, in.
253	746	1032		Main gear center-of-axle X-station in extended position, in.
254	749	1035		Main gear center-of-axle Y-station in extended position, in.
255	748	1038		Ground line Z-station at main gear, in.
256	944	1041		Number of crewmembers
257	861	1042		X-cg crew, in.
258[b]	1167	1043		Number of engines
259[b]	1171	1044		Engine maximum diameter, in.
260[b]	c	1045		X-station engine front face, in.
261[b]	1170	1046		Engine length, in.

TABLE 12. GDSAVE TEMPORARY SAVE ARRAY LOCATIONS (CONCL)

GDSAVE Loc	"GENERAL" Deck Loc	"FUSELAGE" Deck Loc	"AIS" Deck Loc	Description
262	c	1047		Wing chord at side of fuselage, in.
263	c	1048		Horizontal tail chord at side of fuselage, in.
264	c	1049		Vertical tail chord at side of fuselage, in.
265	962	1050		Wing thickness to chord ratio
266[b]	1168	1051		Maximum sea-level static thrust per engine, lb
267-270				Not used

[a]Only if horizontal tail mounted on fuselage

[b]Only if fuselage-buried engine concept

[c]Calculated from "GENERAL" data deck variables

where

C_R = root chord, in.
S = surface planform area, ft^2
AR = aspect ratio
λ = taper ratio

Chord at the side of fuselage station is then calculated by equation 2.

$$C_{SF} = C_R \left[1 - \frac{(1 - \lambda)\, b_{SF}}{6\sqrt{S\, AR}}\right] \tag{2}$$

where

C_{SF} = chord at fuselage-to-surface intersection, in.
b_{SF} = distance from root chord to fuselage-to-surface intersection, in.

Equation 2 is used to calculate wing chord at the side of fuselage station; equation 1 is used to calculate vertical tail chord at the side of fuselage station. Should exposed horizontal tail geometry be defined, equation 1 is used to calculate chord at the side of fuselage station. If total horizontal tail geometry is defined, equation 2 is used.

Engine front face station is determined from equation 3.

$$X_{FF} = X_{LE} + LD \tag{3}$$

where

X_{LE} = inlet leading edge station, in.
LD = inlet length, also last duct station relative to inlet leading edge, in.

Variables in the "GENERAL" design data file record which are used in the foregoing calculations are discussed in Table 13.

TABLE 13. VARIABLES IN "GENERAL" DATA FILE RECORDS USED IN READ CALCULATIONS

Data Loc	Description
1	Constant, 1.0
2	Constant, 2.0
6	Constant, 6.0
12	Constant, 12.0
951	Wing planform area, ft^2
952	Wing aspect ratio
953	Wing taper ratio
957	Buttock line of wing to fuselage tie, in.
1001	Horizontal tail planform area (refer to location 1030), ft^2
1002	Horizontal tail aspect ratio (refer to location 1030)
1003	Horizontal tail taper ratio (refer to location 1030)
1007	Buttock line of horizontal tail to fuselage tie, in.
1030	Input horizontal planform data-type indicator 0 = gross planform data given 1 = exposed planform data given
1041	Vertical tail planform area, ft^2
1042	Vertical tail aspect ratio
1043	Vertical tail taper ratio
1173	X-station inlet leading edge of inboard engine package, in.
1202	n, number of duct cuts
1210+n	X-station of last duct cut referenced from leading edge station (refer to location 1202), in.

Should blocked mission segment data be included in "GENERAL" data, these data are used to replace the appropriate data in file record 5. Forty-eight variables, starting at "GENERAL" data location 1401, define the blocked mission segment data. These data are stored in record 5 according to the vehicle type and are defined on case control card 2 (ND(1)), shown as follows:

ND(1) Value	Record 5 Locations	Vehicle Category
1	1 - 48	Fighter (F)
2	49 - 96	Attack (A)
3	97 - 144	Tactical bomber (BI)
4	145 - 192	Strategic bomber (BII)
5	193 - 240	Cargo assault (CA)
6	241 - 288	Cargo transport (CT)

"FATIGUE" data consist of fatigue design data and wing bending moment spectrum data. The complete "FATIGUE" data array is stored in file record 29 – Spectrum data, locations 1501 through 2330 in the "FATIGUE" deck, are written in file record 38.

During the processing of case design data decks, certain variables are stored in labeled common block MISC. A list of all XMISC array variables defined in this routine is shown in Table 14.

Arrays and Variables Used

Variables that are processed in this routine are discussed in the individual module descriptions. Table 10 presents a reference to the appropriate volume. Input data deck array variables are also discussed in Volume IX, Users' Manual. Specific variables which are used in calculations and rearrangement are shown in Tables 12 through 14.

Arrays and Variables Calculated

Certain GDSAVE array variables are calculated as shown in Table 12.

TABLE 14. XMISC (MISC BLOCK) VARIABLES DEFINED IN INPUT DATA PROCESSING MODULE

XMISC Loc	Source		Discussion
	Deck Name	Data Loc	
1	TAPE7		Number of different material properties in mass storage file records 41 through 60. Defined by counting the number of TAPE7 material properties records.
15	"WING"	258	Wing material identification number
19	"HORIZONTAL"	258	Horizontal tail material identification number
23	"VERTICAL"	258	Vertical tail material identification number
24	"LG"	46	Maximum design weight for landing gear analysis. If this location is 0.0, landing gear design data, file record 25, are incomplete. This instructs the data management module to complete file record 25.
31	"FUSELAGE"	246	Fuselage cover material identification number
35	"GENERAL"	740	Vehicle sink speed, ft/sec
36	"GENERAL"	741	Main landing gear stroke, in.
37	"GENERAL"	20	Factor, limit to ultimate design load
38	"GENERAL"	33	Taxi load factor
40	"GENERAL"		Indicator to designate whether "GENERAL" deck was read as part of the case data set 0.0 = "GENERAL" deck present 1.0 = "GENERAL" deck not read
41	"FUSELAGE"	249	Fuselage minor frame identification number
51-69			Airloads module computation controls, obtained from case control card 2 (refer to Table 4)
85-100			Case title obtained from first two cards on case data deck

Scratch Arrays and Variables

DNAME	Input data deck title
I	Scratch counter
IND	Input data deck index (refer to Table 11)
INDT	Scratch counter 1 = wing 2 = horizontal tail 3 = vertical tail
IR	File record counter for material properties
L	Scratch counter
LIM	File record length
LOC	Scratch counter
MP	Indicator for TAPE7 read 0 = not material properties data 1 = material properties data
N	TAPE7 record counter
NCASE	Case number, temporary save
ND	Temporary storage of first 22 indicators on control card 2
NDS1	Initial location of input wing spectra data in file record 5
NDS2	Last location of input wing spectra data in file record 5
NMATL	Number of different material properties in mass storage file
NR	Record number

Labeled Common Arrays

IFL	Program flow indicators (refer to Table 8)
IP	Program print indicator (refer to Table 3) IP(1) is used in this module for: 0 = print file records as they are created from TAPE7 data 1 = do not print IP(2) is used in this module for: 0 = print case design data records 1 = do not print
FDAT	Cleared to 0.0 in initialization procedure
XMISC	Load module controls from control card 2 and certain variables (refer to Table 9)

Mass Storage File Records

Refer to Table 10 for file records pertinent to this routine.

Error Messages

BAD TITLE CARD---AAAAA

The foregoing message is printed when an unrecognizable input data deck title card is encountered. AAAAA is the alphanumeric image of information on that card. Numeric data which follow the bad title card are not used.

THE DATA IN LOCATIONS 1401-1448 IN THE VARIABLE GENERAL DATA HAS BEEN PLACED IN LOCATIONS NDS1-NDS2 IN ARRAY DS (RECORD 5)

The foregoing message is printed to remind the user that blocked mission segment data were input.

SUBROUTINE DECRD

General Description

Deck name:	DECRD
Entry name:	DECRD (V)
Called by:	READ
Subroutines called:	None

This routine provides the facility for reading a variable number of pieces of real data from the input device, TAPE5, and storing them in specified elements (either sequential or nonconsecutive) of an array. The argument, V, is the name of the real array to be read. Only the information specified is actually read into storage; the remaining elements of the array are unchanged.

Data are usually written on the form, Fortran Fixed 10 Digit Decimal Data. Each card must contain an index, an integer written in columns 1 through 12. The five data fields of 12 columns each (columns 13 through 72) contain input data of the real type. However, any data field may be left blank to indicate that the corresponding location is not to be changed. Columns 73 through 80 contain the identification.

The index defines the location of the first piece of data on the card within the array specified as the argument. This integer must be written to the extreme right of the field. If the name of the array is not subscripted in the CALL statement, the index can be considered equivalent to the subscript of a one-dimensional array. For example, if the argument in CALL is the nonsubscripted array name, ARR, and the index is 10, the first piece of data on the card (columns 13 through 24) will be read into ARR (10); the third piece of data (columns 37 through 48) will be read into ARR (12).

For an array with multiple subscripts, the index should be computed so that the particular element can be defined by a single number.

NOTE The index may not be zero or blank.

All data items must be the real type; they are written following the rules for input with the F-type format specification. If an exponent is written, it must be at the extreme right of the field.

1. If the number is written without either an exponent or a decimal point, the point is assumed to be at the extreme right of the field (as if read with an F12.0 format).

2. If the decimal point is explicity written, the number may be positioned anywhere in the field.

3. If no decimal point is written but an exponent is furnished, the point is assumed to be immediately to the left of the exponent.

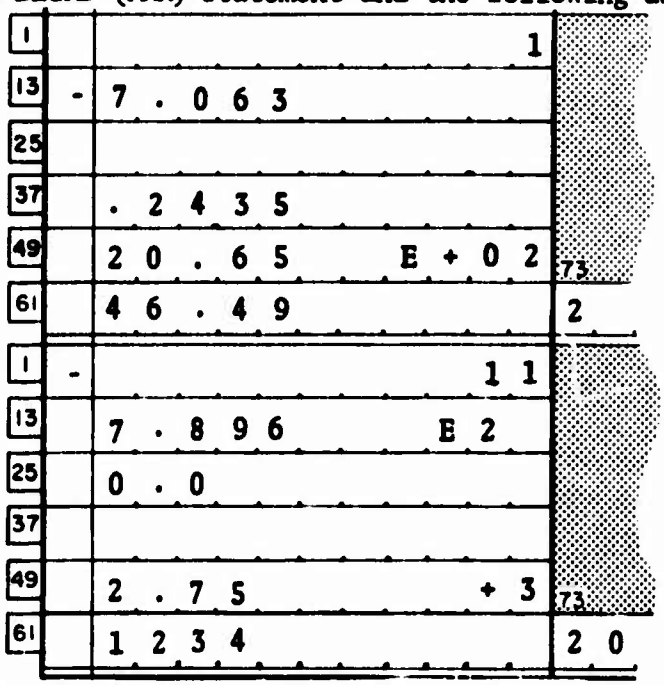
When a field is left blank, no information is read into the location corresponding to this field; the information already in this location is unaltered. A negative zero is read as zero.

Reading is terminated by putting a negative sign in column 1 of the last card to be read.

The data fields of each card are converted twice, using two formats, 5F12.0 and 10A6. The A-type conversion is used to check for blank fields. If the field is not blank, the result of the F-type conversion is stored in the proper element of the specified array. After reading each card, a test is made for a negative sign in the first field; reading is terminated if the sign is negative.

Example:

Assume a CALL DECRD (ARR) statement and the following data cards:



The first card will result in information being stored as follows:

ARR (1)	-0.7063 E+01
ARR (2)	Unchanged
ARR (3)	0.2435 E-00
ARR (4)	0.2065 E+04
ARR (5)	0.4649 E+04

The - sign in column 1 of the second card signals that this is the last card to be read under control of this CALL DECRD statement. This card has been written to illustrate some types of errors (or possible errors) in writing the data. The information will be stored as:

ARR (11)	0.7896 E+21
	(Exponent mislocated or incomplete)
ARR (12)	0.0
ARR (13)	Unchanged
ARR (14)	0.275 E+04
ARR (15)	0.1234 E+11
	(Decimal point assumed at extreme right)

When no decimal point is written, as in the last item, the decimal point is assumed to be at the extreme right of the field.

Arrays and Variables Used

None.

Arrays and Variables Calculated

V	Real array into which data are read

Scratch Arrays and Variables

A	Temporary array into which card columns 13 through 72 alphanumeric image is read
BLANK	Blank location for comparative testing of data field
III	Relative location in V-array of field data
IND	Relative address of first data field (columns 13 through 24)
N	Data field counter
NN	Counter for alphanumeric image of field data
T	Temporary storage of numeric field data

Error Messages

NO DECK LOCATION, A

The foregoing message is printed when the relative address (columns 2 through 12) location on the card is blank. "A" is the alphanumeric image of card columns 13 through 72. This card is skipped, and the reading procedure is continued.

SUBROUTINE DECRD7

General Description

Deck name:	DECRD7
Entry name:	DECRD7 (V)
Called by:	READ
Subroutines called:	None

This subroutine provides the facility for reading a variable number of pieces of real data from the input device, TAPE7, and then in specified elements of an array. All other aspects of this routine are identical to previously discussed subroutine DECRD.

INPUT DATA PROCESSING MODULE FLOW DIAGRAMS

AND FORTRAN LISTINGS

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CARD ID PAGE/BOX NAME REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)

FORTRAN MODULE INPUT DATA PROCESSING MODULE

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - PROCEDURES

(000025) 2.01 10
(000030) 2.04 21 (000020) 2.03
(000034) 2.05 32 (000020) 2.03
(000035) 2.11 5
(000038) 2.11 (000035) 2.12
(000040) 2.01 000 (000037) 2.25
(000041) 2.02 000 (000039) 2.01
(000056) 2.05 2720
(000058) 2.05 (000055) 2.06
(000103) 2.00 1 (000057) 2.25
(000104) 2.00 615
(000104) 2.00 (000104) 3.10
(000107) 3.12 12
(000107) 3.12 (000107) 3.13
(000125) 3.16 000 (000314) 7.12
(000130) 3.10 001 (000127) 3.17
(000134) 3.21 705
(000204) 3.22 525 (000133) 3.20 (000141) 4.03 (000148) 4.07 (000155) 4.11 (000162) 4.15
(000169) 4.19 (000176) 4.23 (000183) 4.27 (000190) 4.31 (000202) 5.16
(000205) 6.03 (000215) 6.07 (000229) 6.17 (000238) 6.21 (000250) 6.26
(000258) 6.30 (000268) 6.34
(000306) 3.23 530
(000305) 3.23 (000305) 3.24
(000120) 4.01 002 (000127) 3.17
(000142) 4.04 718
(000146) 4.05 103 (000127) 3.17
(000149) 4.08 715
(000153) 4.09 004 (000127) 3.17
(000158) 4.12 709
(000160) 4.13 005 (000127) 3.17
(000163) 4.16 705
(000167) 4.17 006 (000127) 3.17
(000170) 4.20 730
(000174) 4.21 007 (000127) 3.17
(000177) 4.24 735
(000181) 4.25 000 (000127) 3.17
(000184) 4.28 740
(000188) 4.29 000 (000127) 3.17
(000191) 4.32 745
(000195) 5.01 010 (000127) 3.17
(000198) 5.04 750
(000202) 5.05 032 (000188) 5.03 (000200) 7.00
(000205) 5.08 7701
(000211) 5.10 7705 (000204) 5.07 (000270) 7.07
(000216) 5.14 7706
(000202) 5.16 035 (000205) 5.13 (000270) 7.07 (000200) 7.00
(000203) 6.01 011 (000127) 3.17
(000207) 6.04 701
(000212) 6.05 012 (000127) 3.17
(000216) 6.08 770
(000224) 6.08 013 (000127) 3.17
(000222) 6.10 37
(000222) 6.10 (000222) 6.11
(000227) 6.14 38
(000227) 6.14 (000227) 6.15
(000230) 6.18 701
(000235) 6.19 014 (000127) 3.17
(000239) 6.22 701
(000244) 6.23 015 (000127) 3.17
(000251) 6.27 700
(000250) 6.28 016 (000127) 3.17
(000260) 6.31 700
(000263) 6.32 017 (000127) 3.17
(000267) 6.35 700
(000271) 7.01 020 (000127) 3.21 (000144) 4.04 (000151) 4.08 (000160) 4.12 (000185) 4.16
(000172) 4.20 (000179) 4.24 (000186) 4.28 (000193) 4.32 (000201) 5.04
(000208) 5.09 (000300) 6.15 (000210) 6.04 (000219) 6.08 (000233) 6.10

CARD ID	PAGE/BOX	NAME	REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)							
			(000242) 8.22	(000253) 8.27	(000261) 8.31	(000269) 8.35	(000350) 8.24			
(000272)	7.02		(000276) 7.06							
(000274)	7.04	523								
(000276)	7.06	521	(000272) 7.03							
(000280)	7.08	7700	(000278) 7.07							
(000308)	7.08	6502	(000307) 3.25							
(000312)	7.11	0503	(000307) 3.25							
(000318)	8.01	510	(000314) 7.12							
(000326)	8.08	519								
(000325)	8.08		(000326) 8.09							
(000337)	8.12	110								
(000338)	8.13	31	(000362) 8.02							
(000340)	8.14		(000341) 8.15							
(000341)	8.15	30								
(000350)	8.20	32	(000340) 8.19							
(000355)	8.22	51	(000353) 8.21							
(000351)	9.01	55	(000302) 5.16	(000353) 8.21						
(000384)	9.03	33	(000340) 8.19							
(000370)	9.04	980	(000089) 3.01	(000386) 9.15	(000687) 15.24					
(000373)	9.06	985								
(000374)	9.07		(000377) 9.09							
(000375)	9.08	1010								
(000377)	9.09	1000	(000374) 9.07							
(000385)	9.14	1031								
(000385)	9.14		(000395) 9.19							
(000388)	9.16	1020	(000378) 9.08							
(000391)	9.17	1110	(000388) 9.16							
(000395)	9.19	1111								
(000400)	9.20	1120	(000388) 9.16							
(000403)	9.22	1121								
(000407)	9.23	1130	(000388) 9.16							
(000410)	9.25	1131								
(000414)	9.26	1140	(000388) 9.16							
(000417)	9.28	1141								
(000421)	10.01	1150	(000388) 9.16							
(000424)	10.03	1151								
(000428)	10.04	1160	(000388) 9.16							
(000431)	10.06	1161								
(000435)	10.07	1170	(000388) 9.16							
(000438)	10.09	1171								
(000443)	10.10	1180	(000388) 9.16							
(000446)	10.12	1181								
(000450)	10.13	1190	(000388) 9.16							
(000453)	10.15	1191								
(000458)	10.16	1195	(000388) 9.16							
(000461)	10.18	1196								
(000465)	10.19	1205	(000388) 9.16							
(000468)	10.21	1206								
(000473)	11.01	1200	(000395) 9.18	(000398) 9.19	(000402) 9.21	(000405) 9.22	(000409) 9.24			
			(000412) 9.25	(000416) 9.27	(000419) 9.28	(000423) 10.02	(000426) 10.03			
			(000430) 10.05	(000433) 10.06	(000437) 10.08	(000441) 10.09	(000445) 10.11			
			(000448) 10.12	(000452) 10.14	(000456) 10.15	(000460) 10.17	(000463) 10.18			
			(000467) 10.20	(000471) 10.21						
(000478)	11.04	1231	(000476) 11.03							
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(000488)	11.10	402								
(000488)	11.10		(000488) 11.11							
(000500)	11.16	403								
(000500)	11.16		(000500) 11.17							
(000502)	11.19	404								
(000502)	11.19		(000502) 11.20							
(000504)	11.22	405								
(000504)	11.22		(000504) 11.23							
(000506)	11.25	406								
(000506)	11.25		(000506) 11.26							
(000508)	11.28	407								
(000508)	11.28		(000508) 11.29							
(000510)	11.31	408								
(000510)	11.31		(000510) 11.32							
(000512)	11.34	409								
(000512)	11.34		(000512) 11.35							
(000520)	12.01	425	(000520) 11.38							
(000527)	12.04	426								

CARD ID PAGE/BOX NAME REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)

(000529) 12.05 427 (000520) 11.20 (000526) 12.03
(000530) 12.00 428
(000545) 12.11 429 (000530) 12.00
(000553) 12.14 1232 (000470) 11.03
(000558) 12.15 1233 (000470) 11.03
(000563) 12.16 1234 (000470) 11.03
(000568) 12.17 1235 (000470) 11.03
(000570) 12.18 1236 (000470) 11.03
(000573) 13.01 1238 (000470) 11.03
(000578) 13.03 1250 (000470) 11.03 (000470) 11.03 (000470) 11.03 (000470) 11.03 (000251) 12.13
(000568) 12.14 (000561) 12.15 (000504) 12.16 (000568) 12.17 (000571) 12.18
(000574) 13.02
(000578) 13.04 1210 (000470) 13.03
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(000583) 13.07 (000500) 13.11
(000585) 13.09 1212
(000588) 13.11 1211 (000503) 13.00
(000590) 13.12 1230 (000470) 13.03
(000600) 13.13 1253 (000500) 13.12
(000602) 13.14 1200 (000500) 13.12
(000601) 13.16 1270 (000504) 13.15
(000603) 14.01 1272 (000001) 13.16
(000610) 14.04 (000611) 14.00
(000611) 14.00 1274
(000624) 14.10 1275 (000001) 13.16
(000630) 14.13 410
(000630) 14.13 (000630) 14.14
(000632) 14.16 411
(000632) 14.16 (000632) 14.17
(000647) 14.23 440
(000647) 14.23 (000647) 14.24
(000654) 14.31 412
(000654) 14.31 (000654) 14.32
(000666) 14.34 413
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(000668) 15.03 414
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(000670) 15.06 (000670) 15.07
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(000672) 15.08 (000672) 15.10
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(000674) 15.12 (000674) 15.13
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(000678) 15.18 442
(000678) 15.18 (000678) 15.19
(000504) 15.22 1200 (000504) 13.15
(000685) 15.23 1251
(000686) 15.23 (000686) 15.24
(000688) 15.25 1500 (000338) 9.16

CHART TITLE - NON-PROCEDURAL STATEMENTS

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - SUBROUTINE DECOD(V)

(000701) 19.01 9 (000719) 19.12 (000718) 19.15
(000701) 19.01 DECOD (000302) 9.12-X (000474) 11.02-X
(000704) 19.04 21
(000705) 19.05 22 (000703) 19.03
(000712) 19.08 7 (000705) 19.05
(000713) 19.07 (000710) 19.11
(000715) 19.09 11
(000716) 19.10 3 (000714) 19.00
(000718) 19.11 2 (000715) 19.00
(000720) 19.13 0
(000720) 19.14 0 (000705) 19.05

CHART TITLE - NON-PROCEDURAL STATEMENTS

CARD ID PAGE/BOX NAME REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BOX)

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - SUBROUTINE DECRD7(V)

(000730) 02.01 5 (000748) 02.12 (000729) 02.15
(000738) 02.01 DECRD7 (000125) 3.1G-X (000302) 5.05-X (000252) 5.11-X (000346) 8.1G-X
(000733) 02.04 21
(000735) 02.05 02 (000732) 02.03
(000741) 02.06 7 (000735) 02.05
(000742) 02.07 (000747) 02.11
(000744) 02.08 11
(000748) 02.10 3 (000743) 02.08
(000747) 02.11 2 (000744) 02.08
(000749) 02.13 6
(000737) 02.14 8 (000735) 02.05

CHART TITLE - NON-PROCEDURAL STATEMENTS

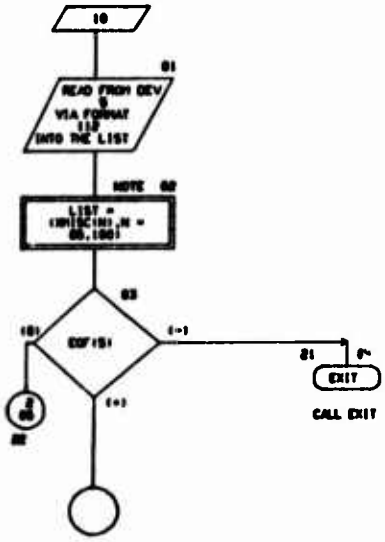
LOCATION		DIAGNOSTIC
CARD ID	PAGE/SEQ	
(000020)	2.03	INPUT ERROR - UNSPECIFIED DESTINATION
(000080)	2.03	MISSING DESTINATION
(000130)	3.10	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000130)	4.01	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000140)	4.05	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000153)	4.09	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000160)	4.13	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000167)	4.17	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000174)	4.21	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000181)	4.25	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000188)	4.29	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000195)	5.01	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000203)	5.05	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000211)	5.10	UNDEFINED - 'READHS' EXTERNAL REFERENCE
(000213)	5.12	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000303)	6.01	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000312)	6.05	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000324)	6.12	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000335)	6.19	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000344)	6.23	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000355)	6.29	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000363)	6.32	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000310)	8.01	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000319)	8.02	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000320)	8.03	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000321)	8.04	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000322)	8.05	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000323)	8.06	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000327)	8.10	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000351)	9.01	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000473)	11.01	UNDEFINED - 'READHS' EXTERNAL REFERENCE
(000573)	13.01	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000602)	13.14	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000603)	14.01	UNDEFINED - 'READHS' EXTERNAL REFERENCE
(000613)	14.07	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000624)	14.13	UNDEFINED - 'READHS' EXTERNAL REFERENCE
(000640)	14.25	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000651)	14.31	UNDEFINED - 'READHS' EXTERNAL REFERENCE
(000660)	15.20	UNDEFINED - 'WRITHS' EXTERNAL REFERENCE
(000703)	19.03	MISSING DESTINATION
(000732)	22.03	MISSING DESTINATION

CHART TITLE - INTRODUCTORY COMMENTS

PROGRAM READ

READ TITLE

CHART TITLE - PROCEDURES



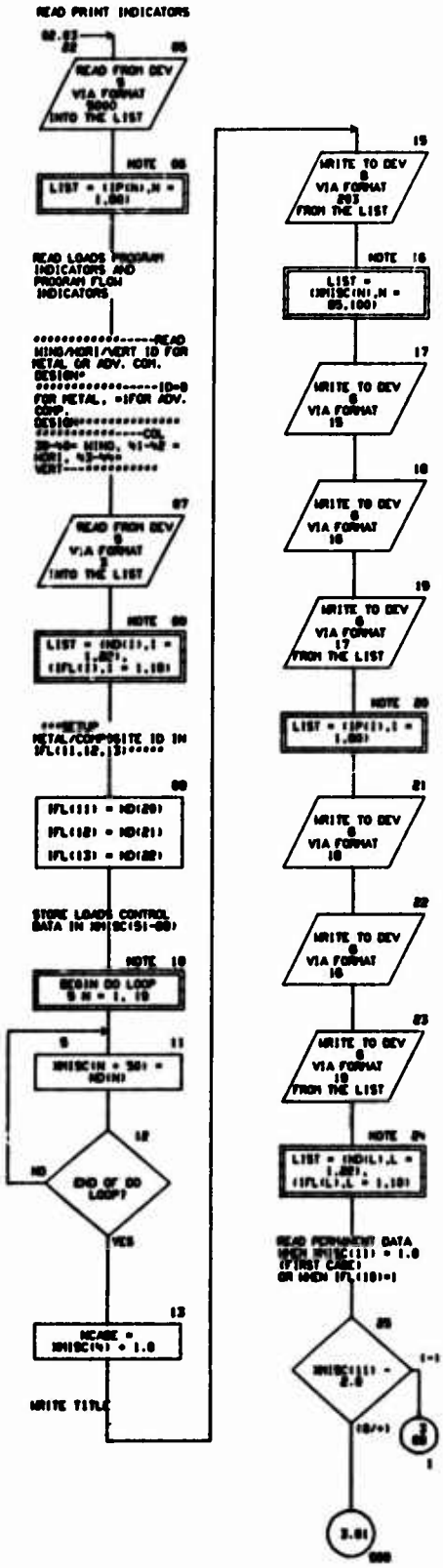


CHART TITLE - PROCEDURES

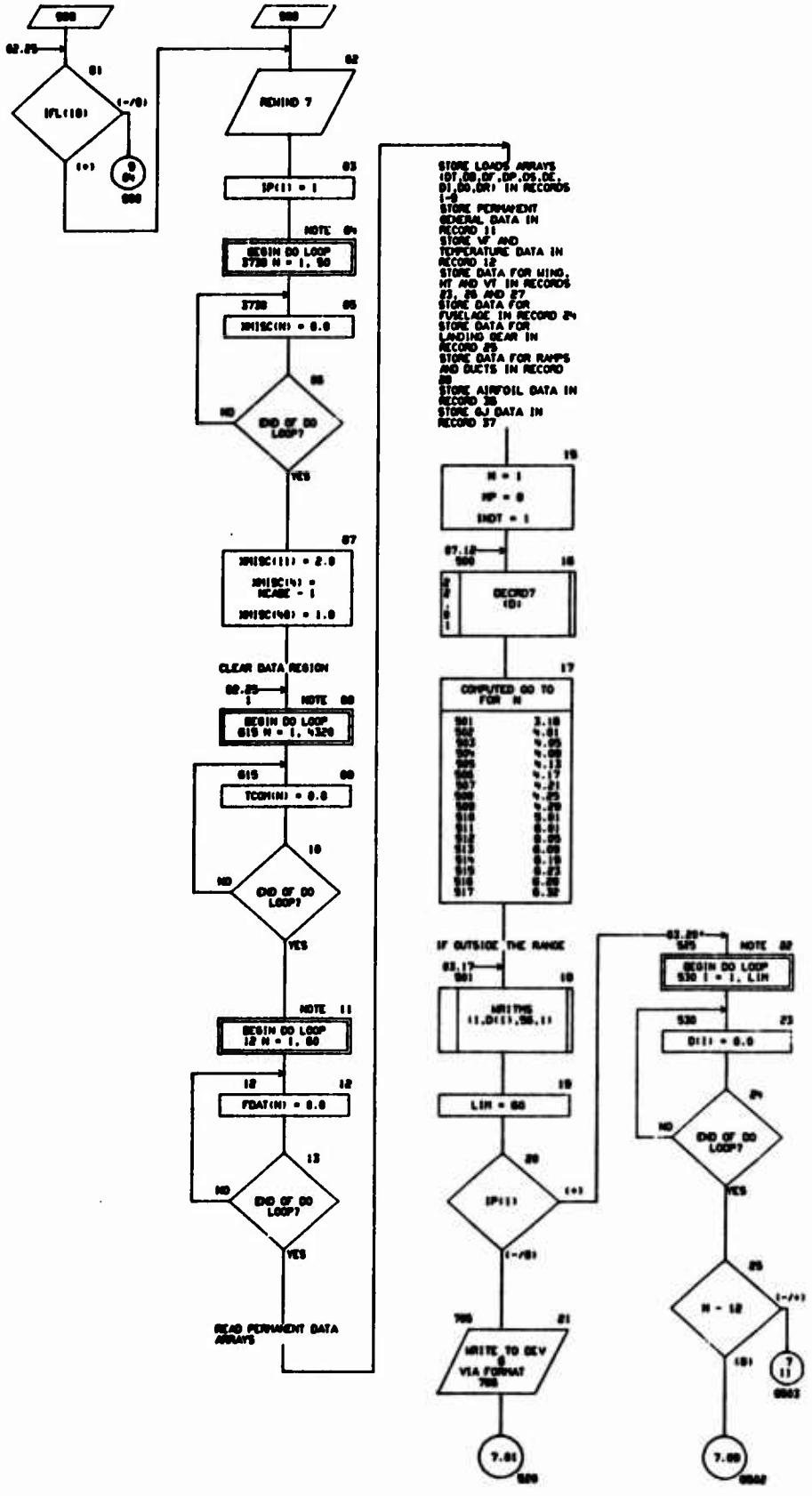
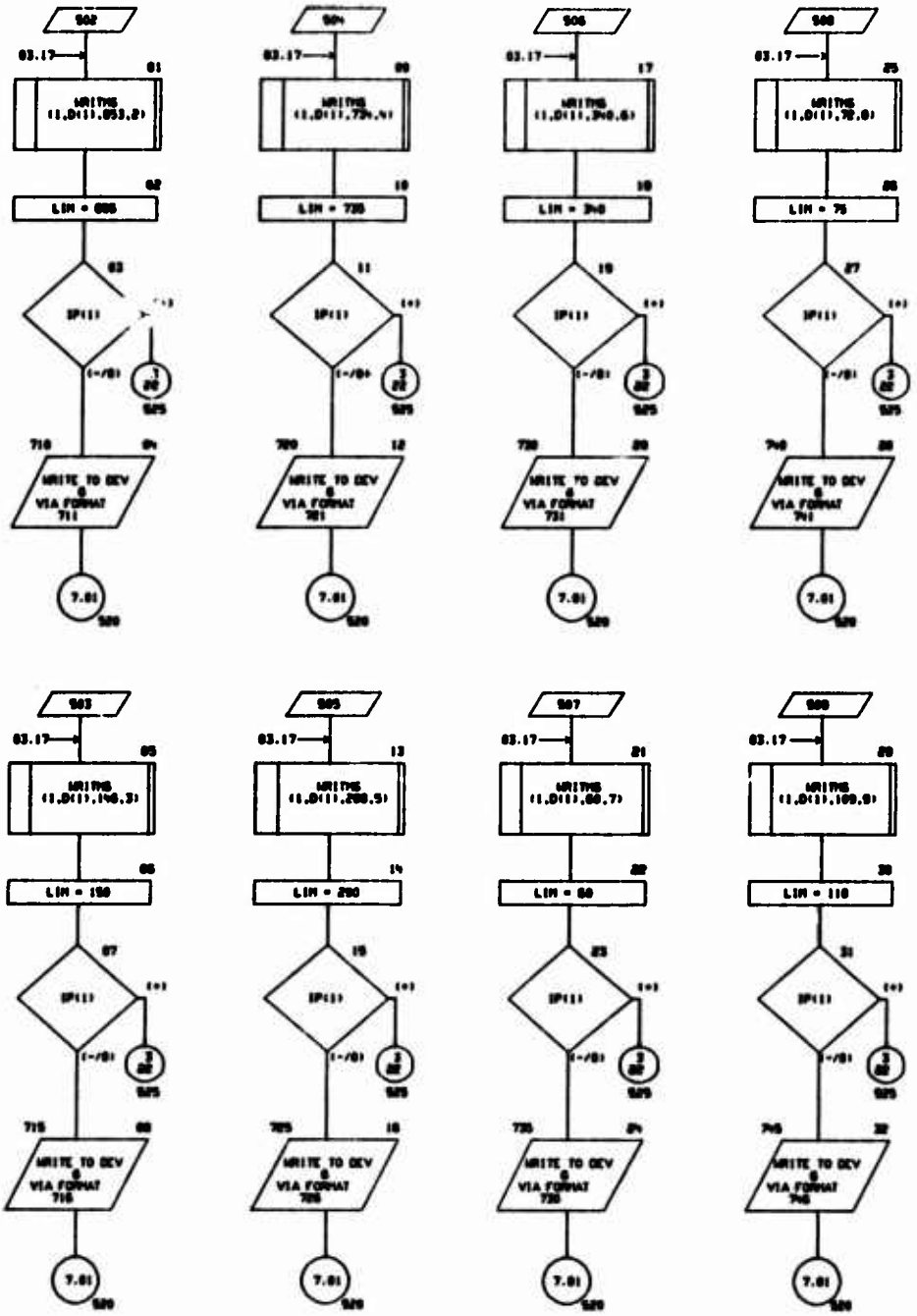


CHART TITLE - PROCEDURES



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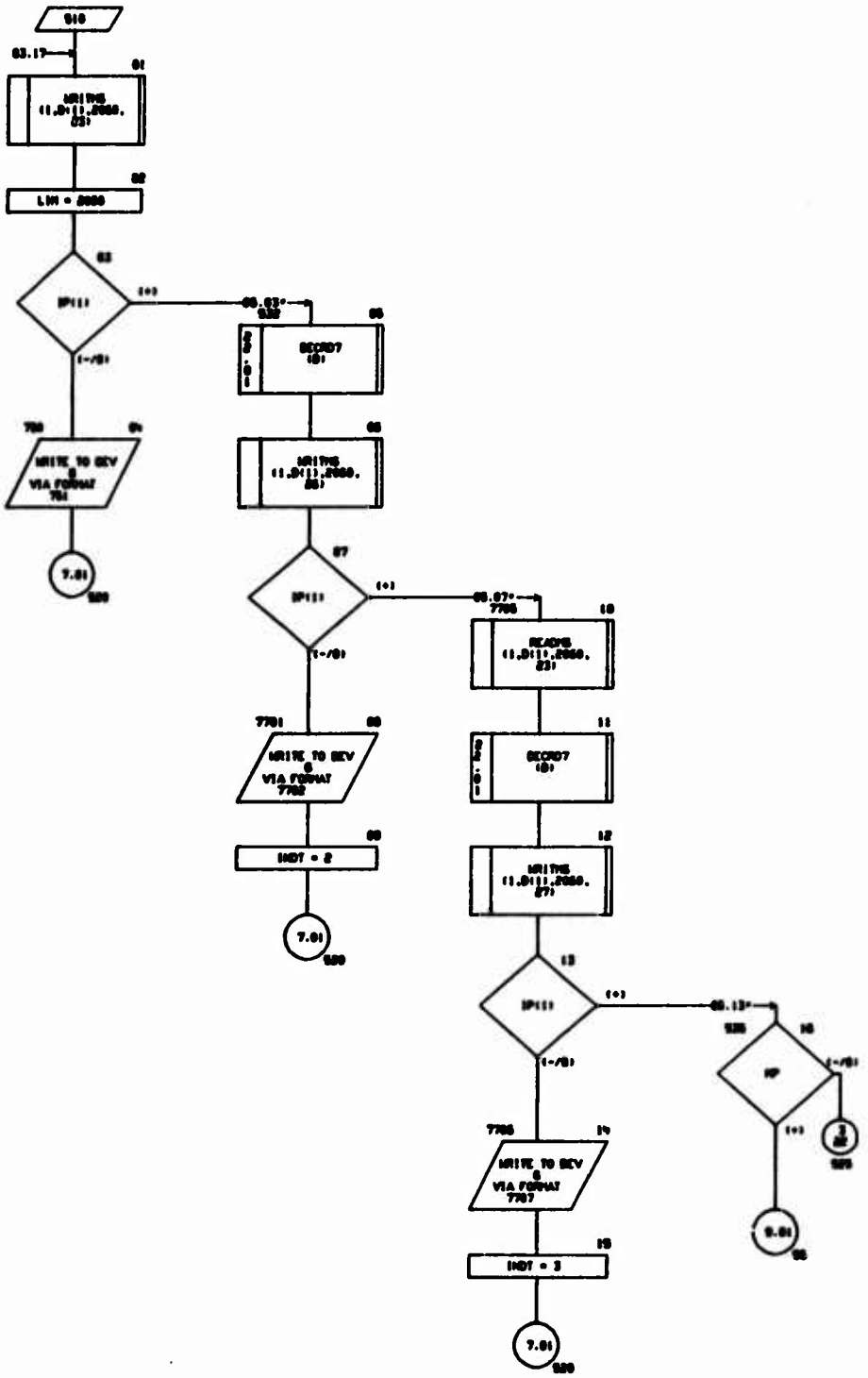

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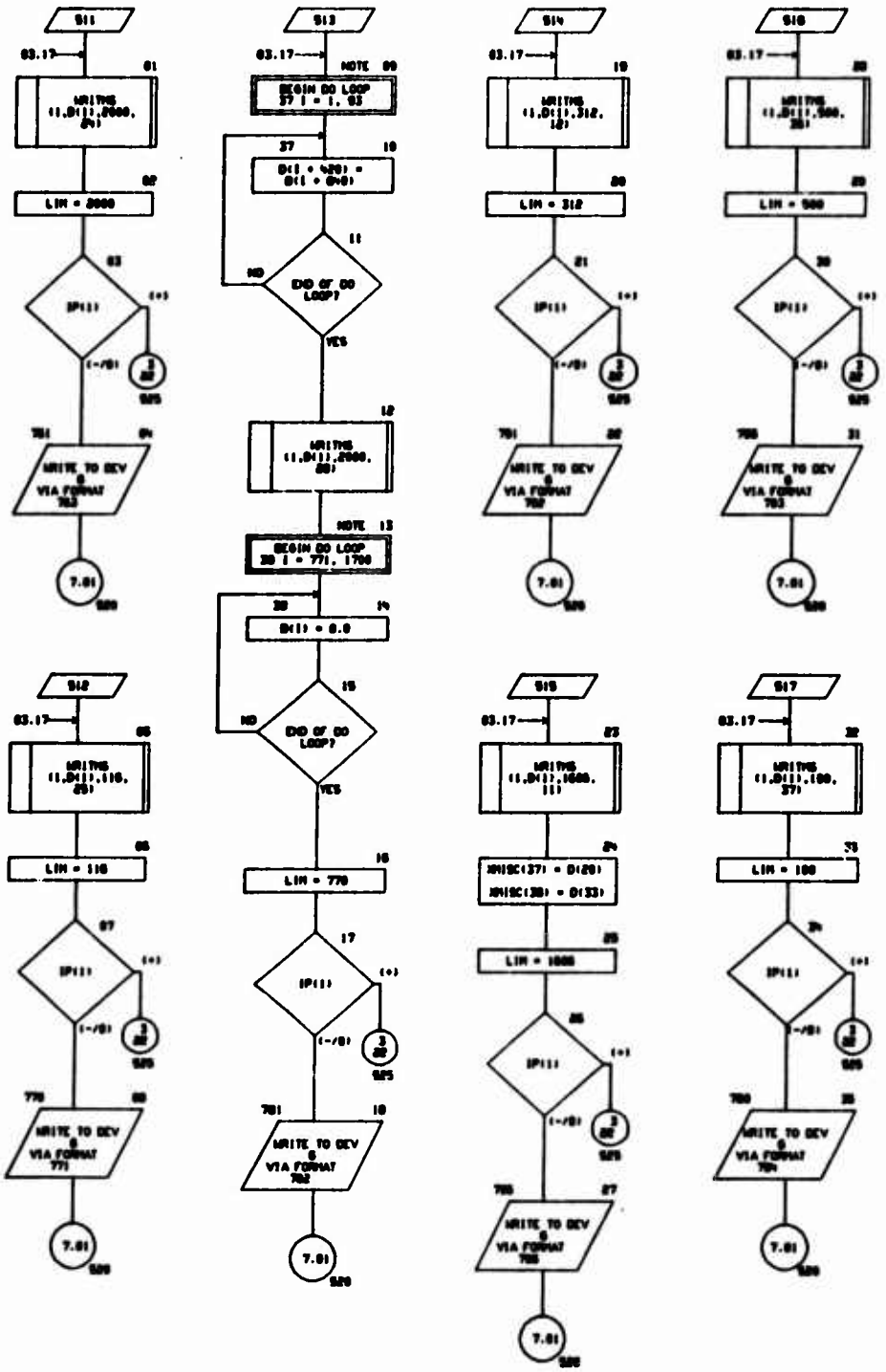

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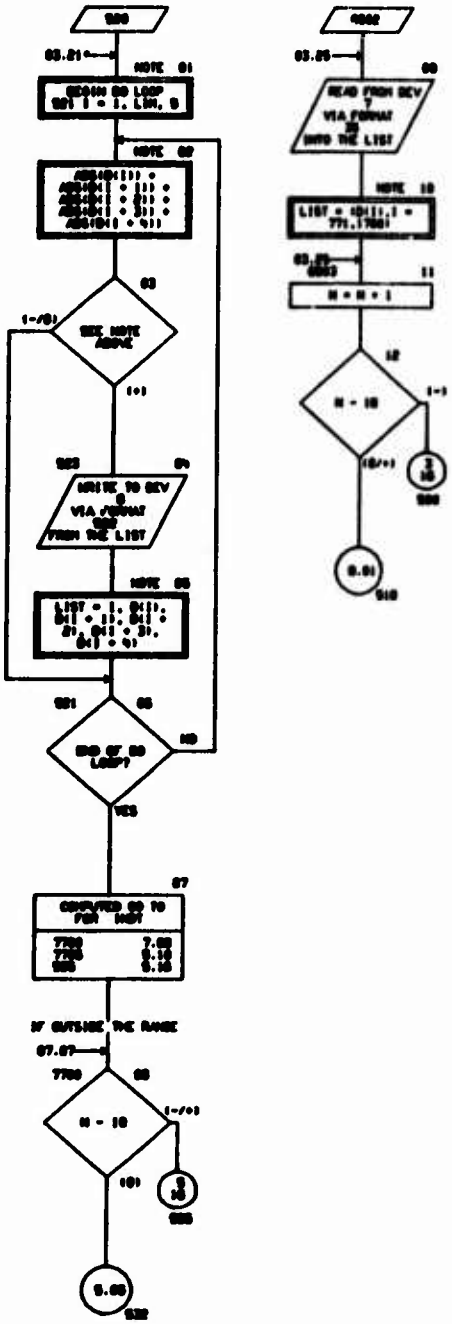

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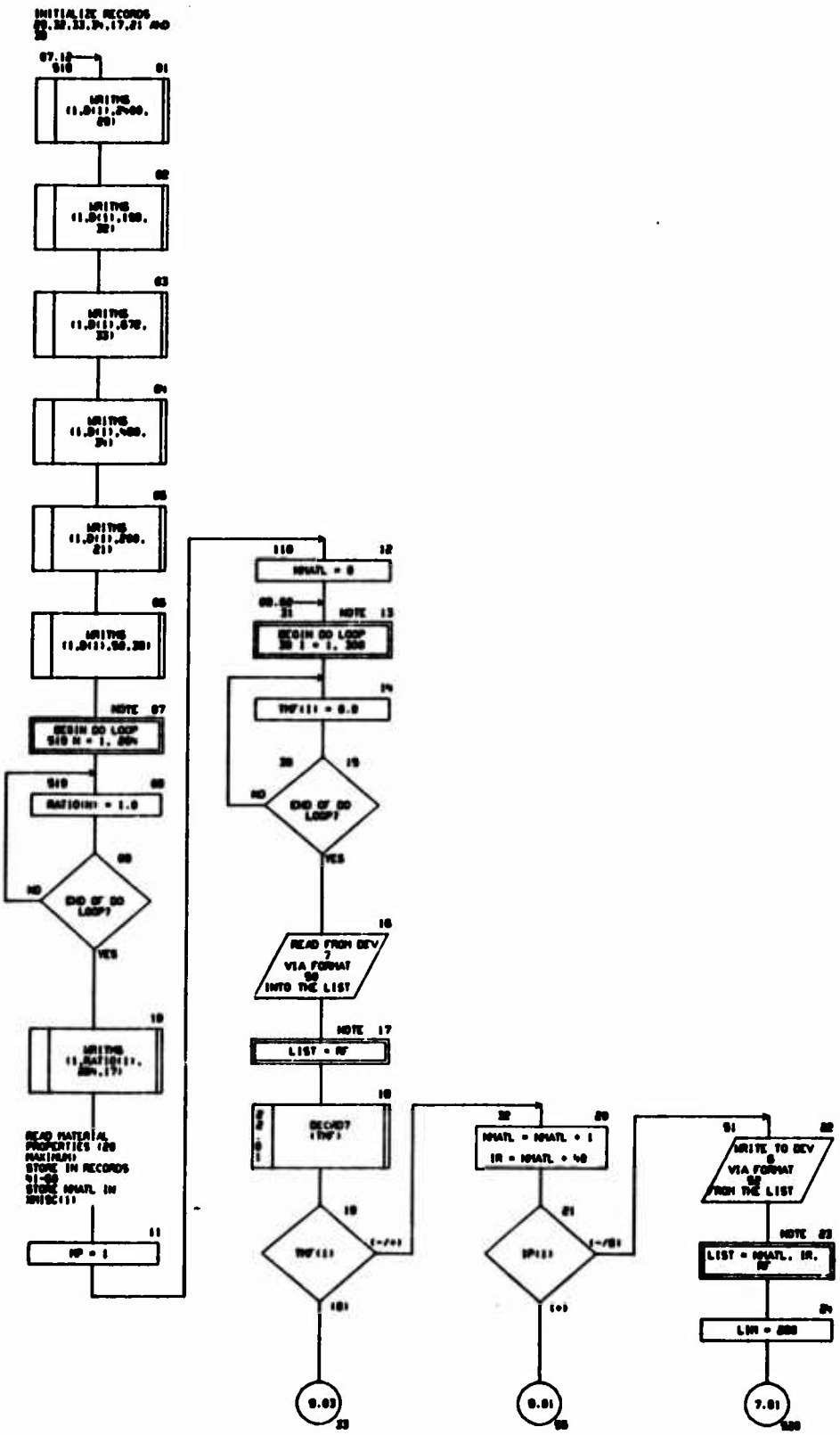

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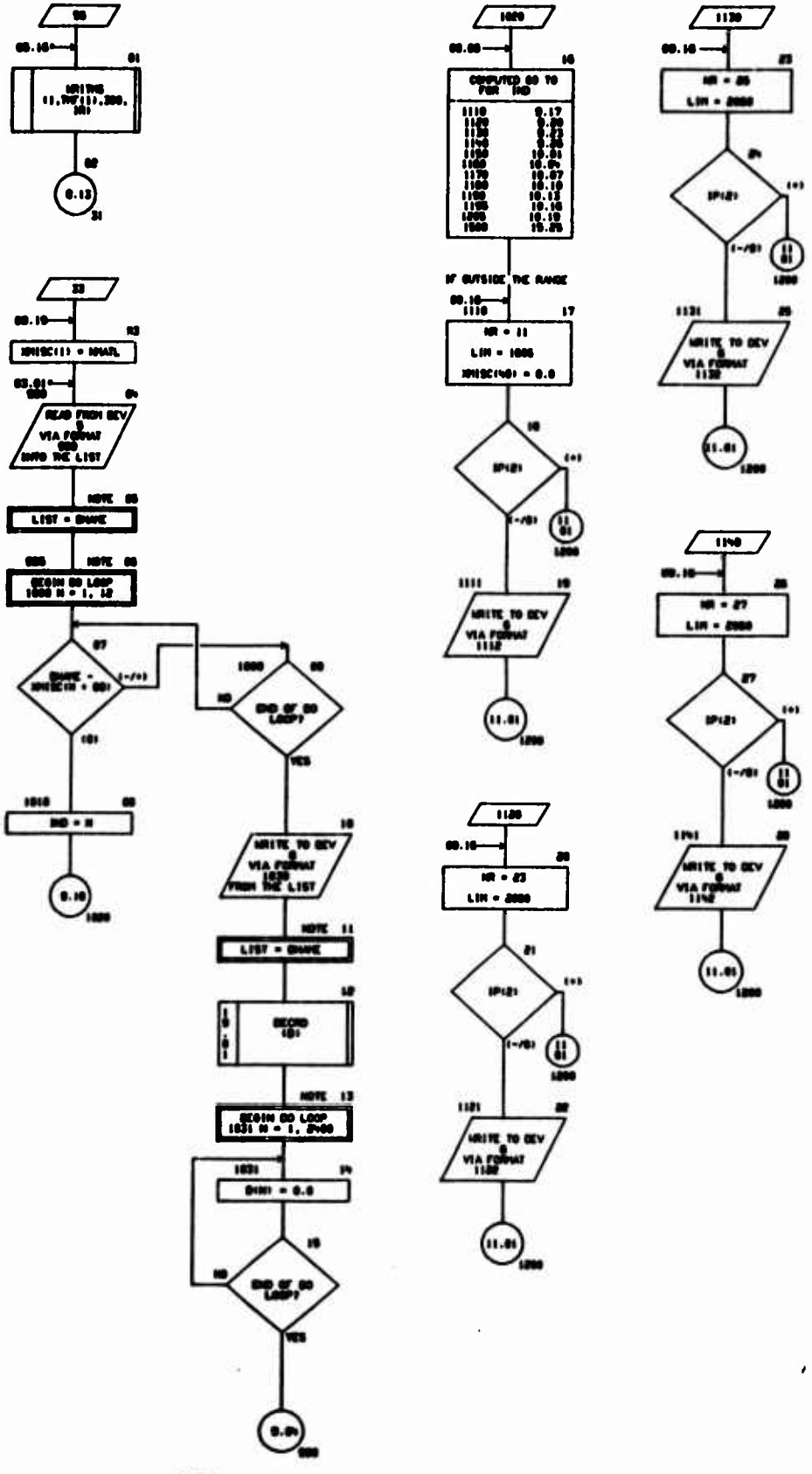

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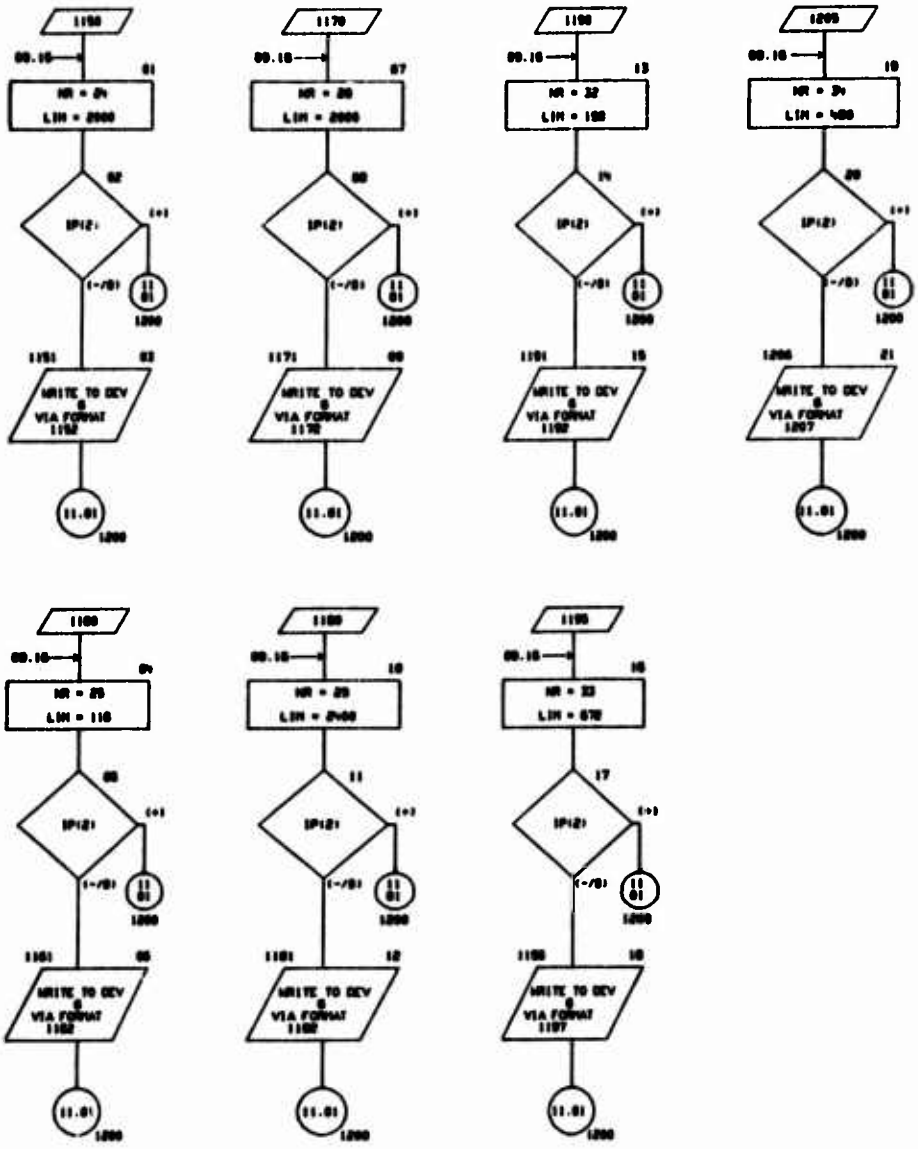

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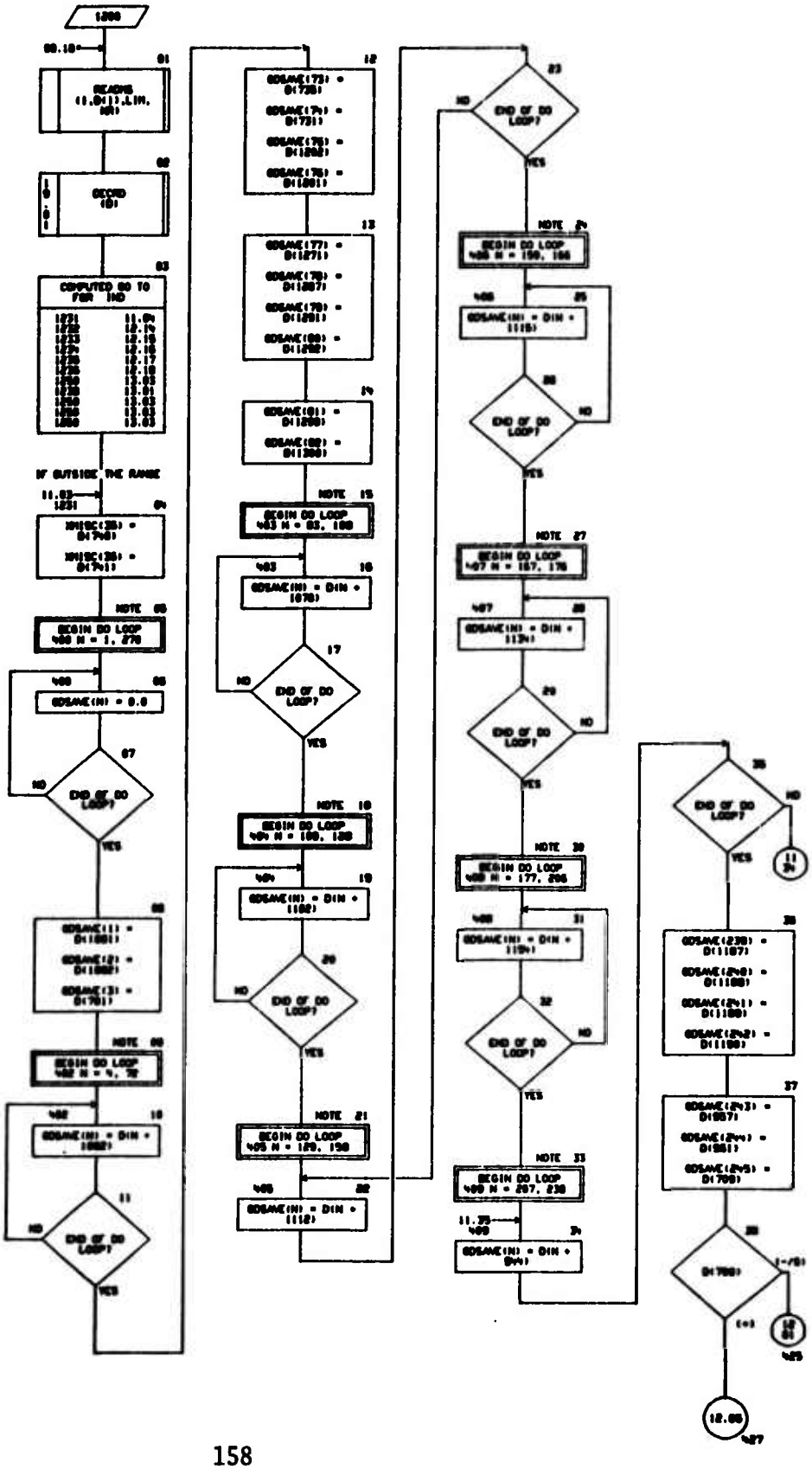

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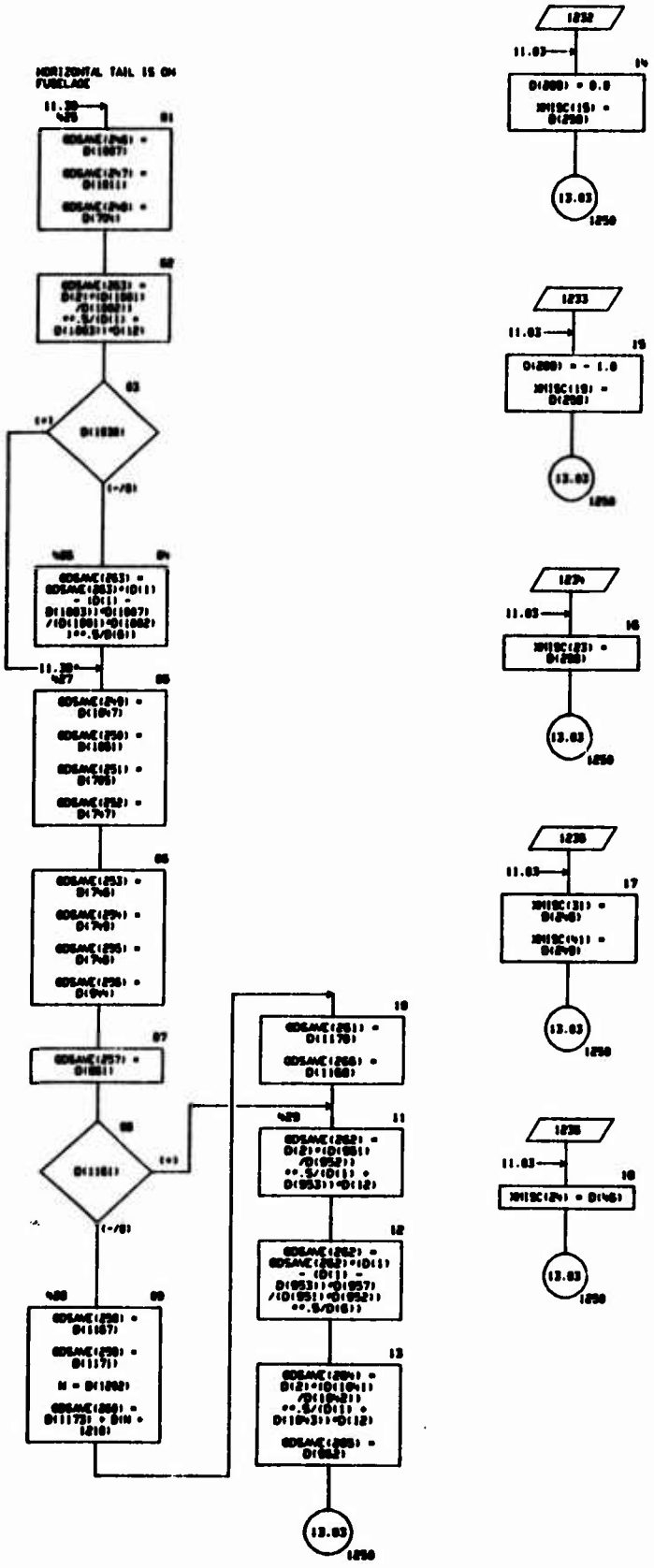

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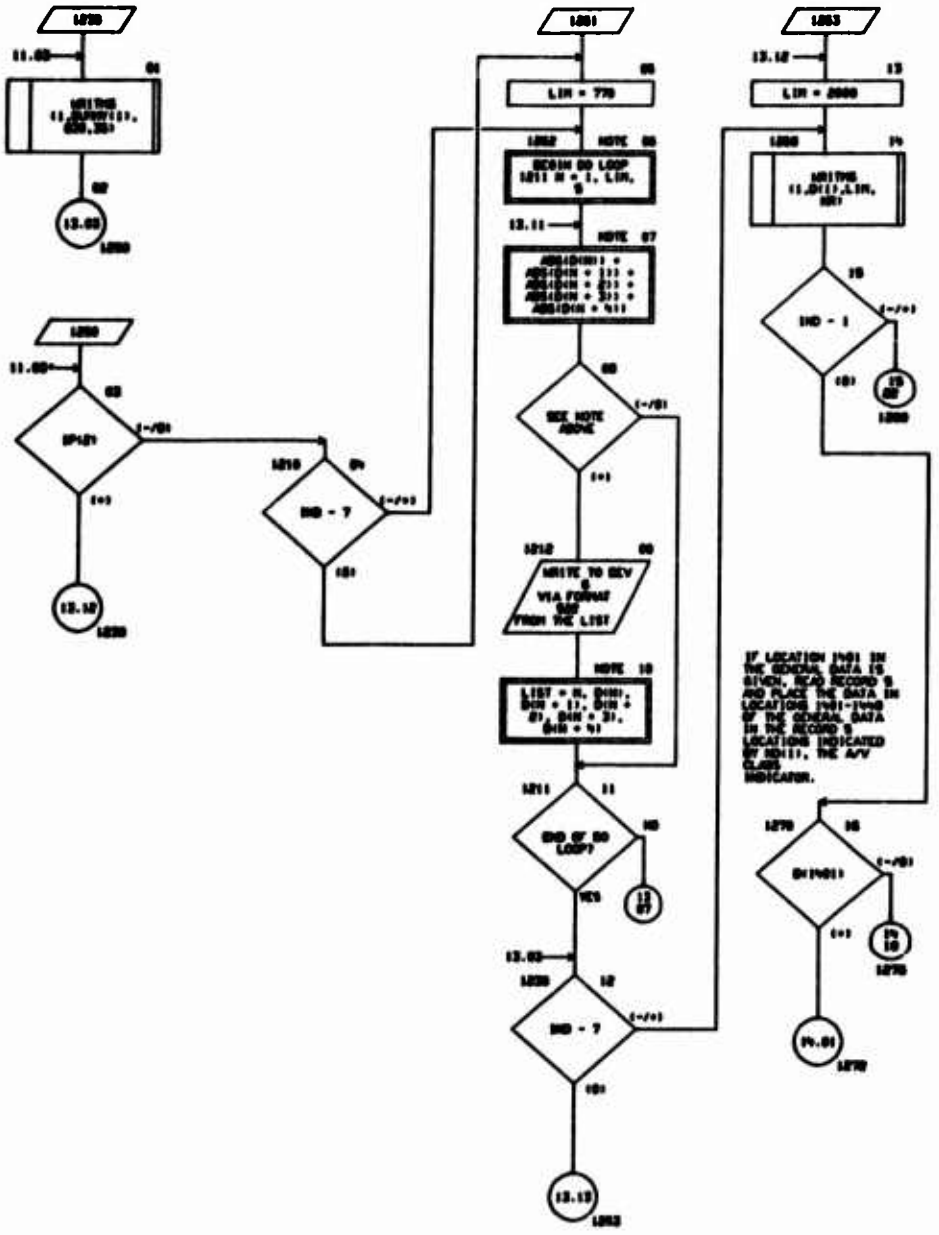

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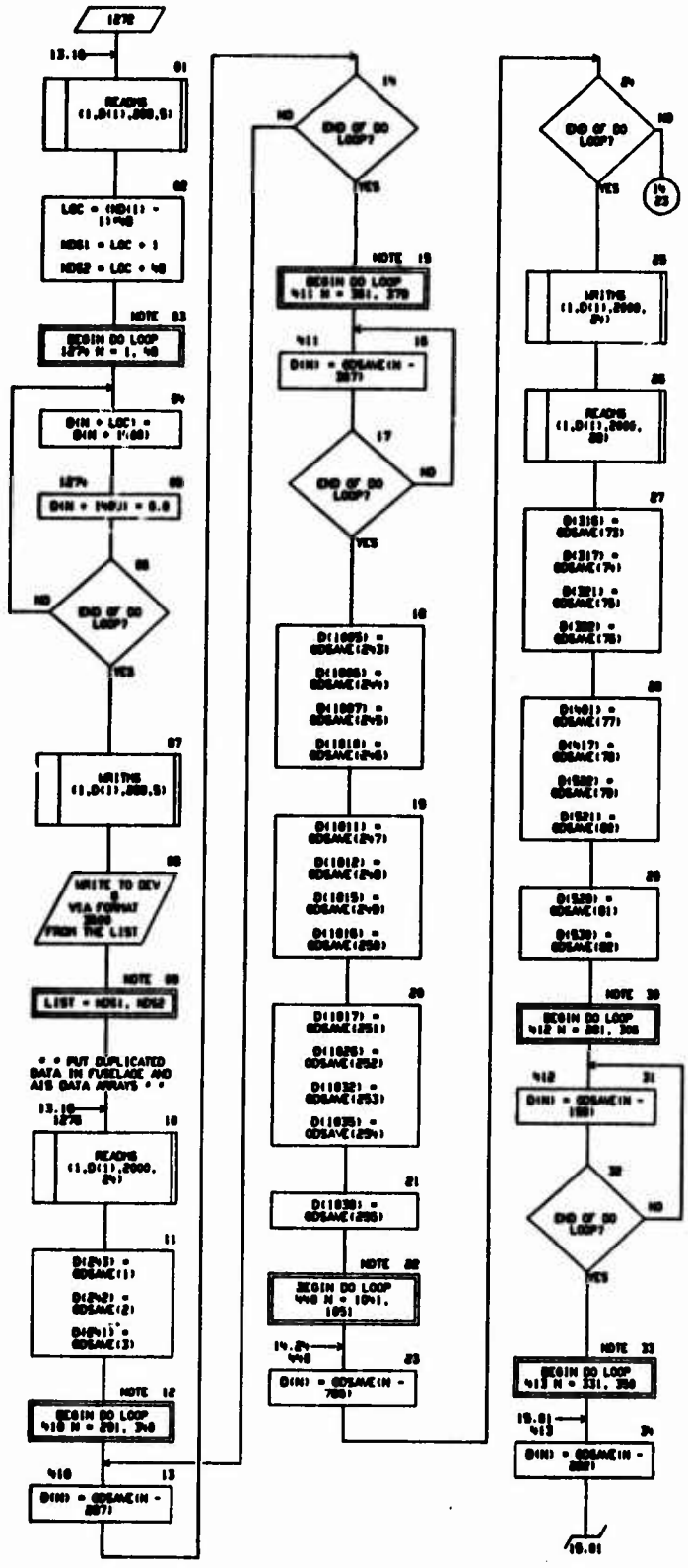

CHART TITLE - PROCEDURES

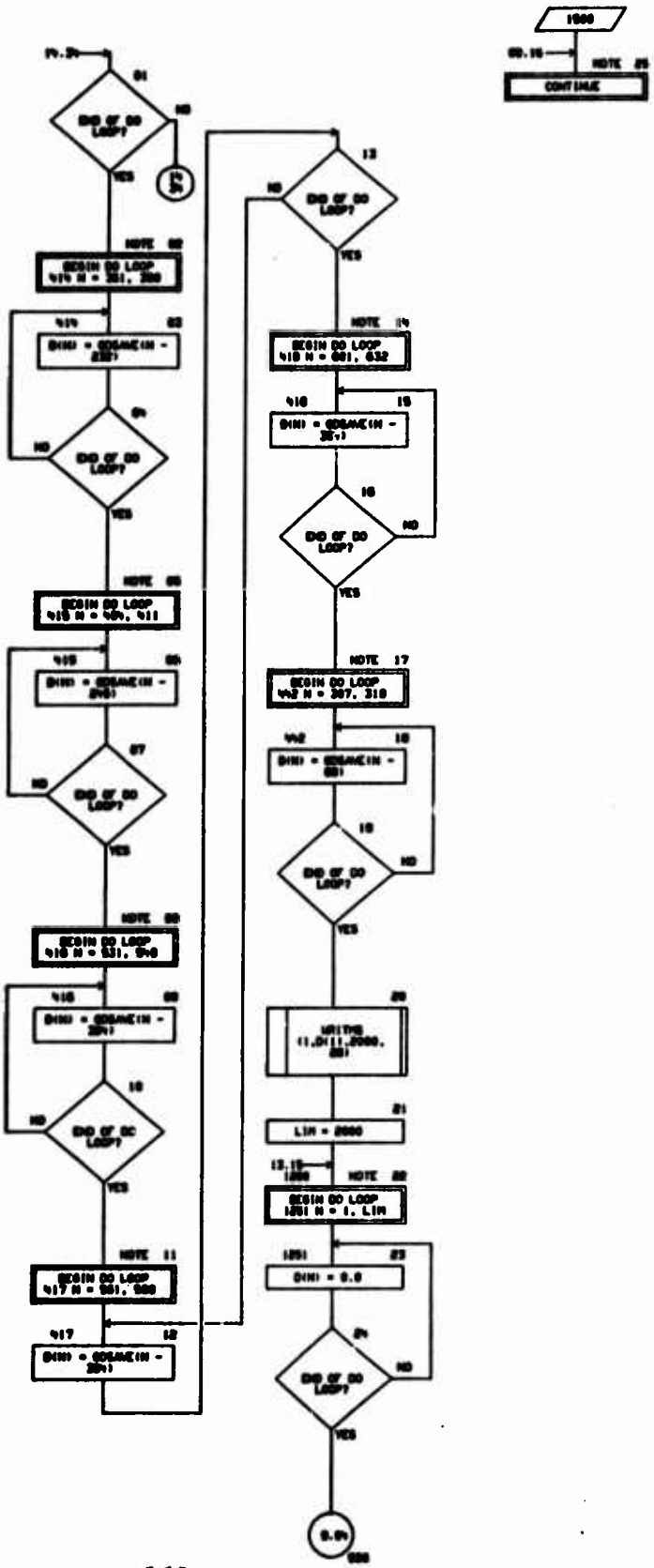

CHART TITLE - NON-PROCEDURAL STATEMENTS

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      PROGRAM READ
      COMMON TCOM(4320)
      COMMON /IPRINT/IP(100)
      COMMON /MISC/ XMISC(100)
      COMMON /FDATT/ FDAT(60)
      COMMON /IFLOW/ IFL(13)
      DIMENSION ND(32),DUMMY(630),TNF(300),RF(16),D(2400)
      DIMENSION CDSAME(270),RATIO(20)
      EQUIVALENCE (RF(1),TNF(285)),(DUMMY(1),D(1501))
      EQUIVALENCE (D(1),TNF(1),TCOM(1),RATIO(1))
  112 FORMAT(8A10/8A10)
 2000 FORMAT(8011)
    3 FORMAT (2212,26X,1011)
  203 FORMAT(1H1,18X,8A10/11X,8A10)
   15 FORMAT(////20X,14HCONTROL CARD 1/)
   16 FORMAT(19X,1H1,8X,1H2,9X,1H3,8X,1H4,8X,1H5,9X,1H6,9X,1H7,8X,
     1H8/18X,80H1234567890123456789012345678901234567890123456789012
     234567890123456789012345678901234567890)
   17 FORMAT(18X,8011//)
   18 FORMAT(20X,14HCONTROL CARD 2/)
   19 FORMAT(18X,2212,26X,1011)
  706 FORMAT(1H1,18X,57H*** PERMANENT DATA (PRINT IN CASE I WHEN IP(1)
     IS 0) ***////28X,38H*** LOADS ARRAY DT(56) - - RECORD 1 ***//)
  711 FORMAT(1H1,26X,46H*** LOADS ARRAY DB(853) - - RECORD 2 ***//)
  716 FORMAT(1H1,26X,46H*** LOADS ARRAY DF(146) - - RECORD 3 ***//)
  721 FORMAT(1H1,26X,46H*** LOADS ARRAY DP(734) - - RECORD 4 ***//)
  726 FORMAT(1H1,26X,46H*** LOADS ARRAY DS(288) - - RECORD 5 ***//)
  731 FORMAT(1H1,26X,46H*** LOADS ARRAY DE(340) - - RECORD 6 ***//)
  736 FORMAT(1H1,26X,38H*** LOADS ARRAY DI(60) - - RECORD 7 ***//)
  741 FORMAT(1H1,26X,38H*** LOADS ARRAY DG(72) - - RECORD 8 ***//)
  746 FORMAT(1H1,26X,46H*** LOADS ARRAY DR(100) - - RECORD 9 ***//)
  751 FORMAT(1H1,24X,45H*** PERMANENT DATA FOR WING - - RECORD 23 ***//)
  753 FORMAT(1H1,22X,46H*** PERMANENT DATA FOR FUSELAGE - - RECORD 24 **
     *//)
  771 FORMAT(1H1,21X,52H*** PERMANENT DATA FOR LANDING GEAR - - RECORD 25
      ***//)
  782 FORMAT(1H1,16X,61H*** PERMANENT DATA FOR AIR INDUCTION SYSTEM - -
     RECORD 28 ***//)
  792 FORMAT(1H1,17X,58H*** PERMANENT DATA FOR W AND TEMPERATURE - - RE
     CORD 12 ***//)
  706 FORMAT(1H1,25X,44H*** PERMANENT GENERAL DATA - - RECORD 11 ***//)
  783 FORMAT(1H1,30X,34H*** AIRFOIL DATA - - RECORD 36 ***//)
  794 FORMAT(1H1,32X,29H*** GJ DATA - - RECORD 37 ***//)
  802 FORMAT(1H ,14,9E10.6)
 7702 FORMAT(1H1,18X,58H*** PERMANENT DATA FOR HORIZONTAL TAIL - - RECOR
     D 26 ***//)
 7707 FORMAT(1H1,19X,54H*** PERMANENT DATA FOR VERTICAL TAIL - - RECORD
     27 ***//)
   35 FORMAT(20A4)
   90 FORMAT(8A10/8A10)
   92 FORMAT(1H1,27X,19H*** MATERIAL NUMBER,I3,1H - - RECORD,I3,4H ***/
      / 7X,8A10/ 7X,8A10//)
  900 FORMAT(A10)
 1010 FORMAT(1H1,23H*** BAD TITLE CARD --- ,A10,4H ***)
 1112 FORMAT(1H1,30X,34H*** GENERAL DATA - - RECORD 11 ***//)
 1122 FORMAT(1H1,31X,31H*** WING DATA - - RECORD 23 ***//)
 1132 FORMAT(1H1,25X,43H*** HORIZONTAL TAIL DATA - - RECORD 26 ***//)
 1142 FORMAT(1H1,27X,46H*** VERTICAL TAIL DATA - - RECORD 27 ***//)
 1152 FORMAT(1H1,30X,35H*** FUSELAGE DATA - - RECORD 24 ***//)
 1162 FORMAT(1H1,27X,38H*** LANDING GEAR DATA - - RECORD 25 ***//)
 1172 FORMAT(1H1,23X,47H*** AIR INDUCTION SYSTEM DATA - - RECORD 28 ***/
      /)
 1182 FORMAT(1H1,30X,34H*** FATIGUE DATA - - RECORD 29 ***//)
```

CHART TITLE - NON-PROCEDURAL STATEMENTS

```
1002    FORMAT(1H1,19X,57H*** WIND, HORIZONTAL AND VERTICAL LOADS - - RECO
        RD 32 ***//)
1007    FORMAT(1H1,28X,38H*** FUSELAGE LOADS - - RECORD 33 ***//)
1007    FORMAT(1H1, 8X,78H*** FUSELAGE INERTIA, WEIGHT DISTRIBUTION AND PR
        ESSURE TABLES - - RECORD 34 ***///)
2000    FORMAT(1H1,14X,60HTHE DATA IN LOCATIONS 1401-1440 IN THE VARIABLE
        GENERAL DATA/
                19X,28H4B BEEN PLACED IN LOCATIONS ,13,1H-,13,23H IN A
        BRAY OS (RECORD 5))
```

CHART TITLE - INTRODUCTORY COMMENTS

SUBROUTINE DECK2

CHART TITLE - SUBROUTINE SECRD(V)

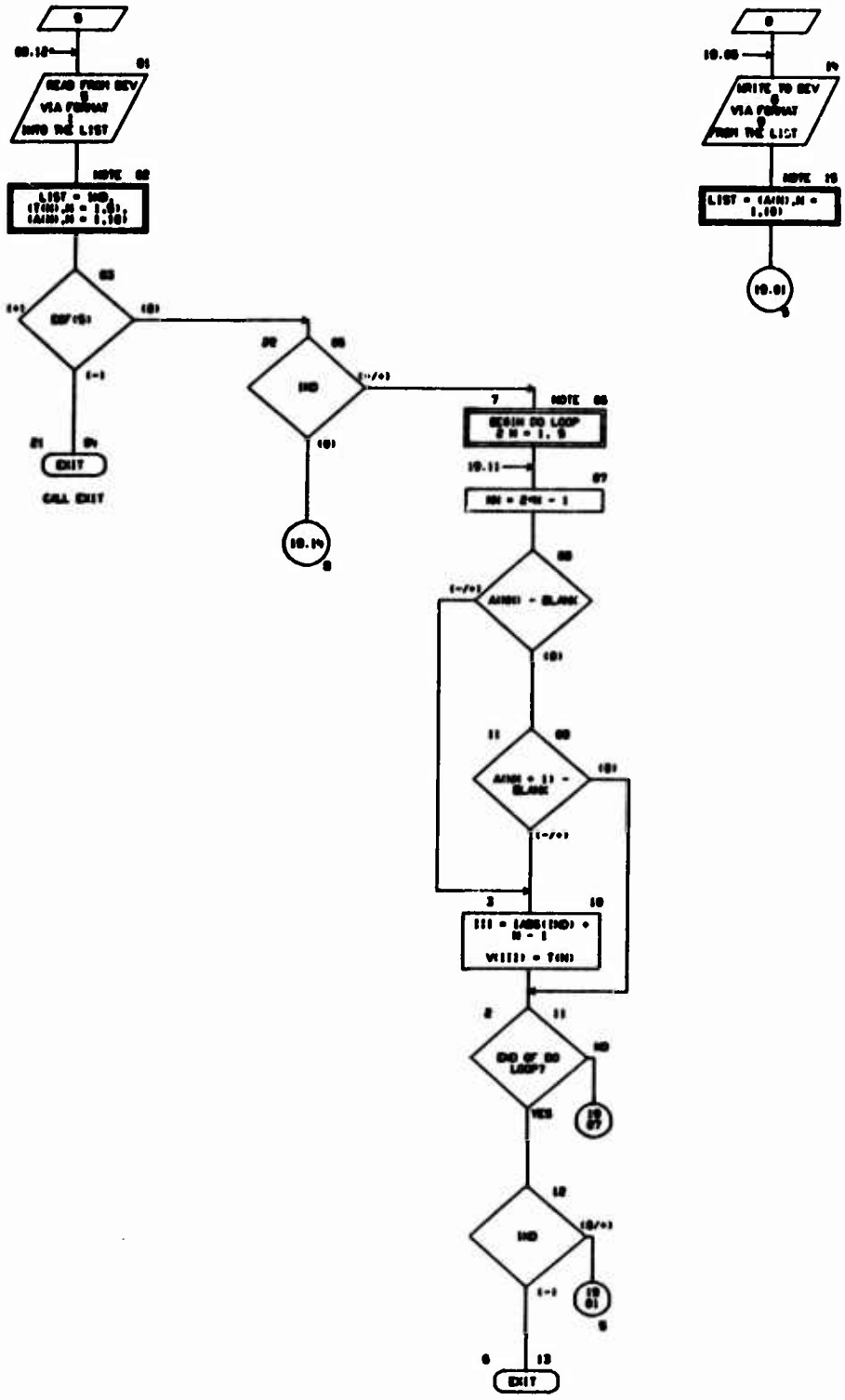

CHART TITLE - NON-PROCEDURAL STATEMENTS

```
      DIMENSION V(1),T(5),A(18)
      DATA BLANK/4H    /
    8 FORMAT(I1,I12,T13,9F12.0,T13,18A6)
    9 FORMAT(/17H NO DECK LOCATION,9X,18A6/)
```

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - SUBROUTINE DECOD7(V)

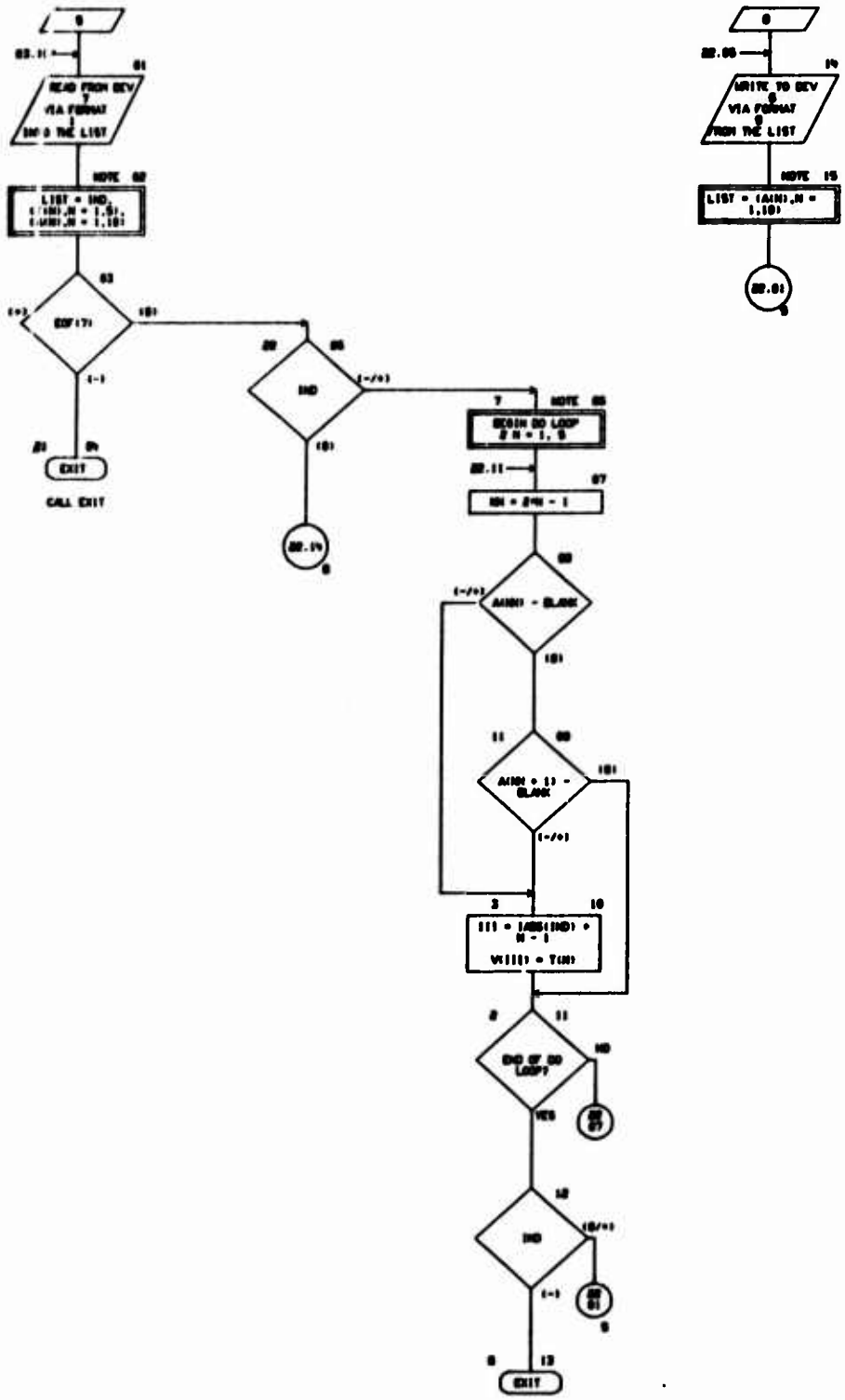

CHART TITLE - NON-PROCEDURAL STATEMENTS

```
      DIMENSION V(1),T(5),A(10)
      DATA BLANK/4H    /
    1 FORMAT(T1,I12,T13,6F12.0,T13,10A8)
    9 FORMAT(//13H NO DECK LOCATION,5X,10A8/)
```

CARD NO **** CONTENTS ****

```
C
C ((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((
C                                 PROGRAM READ
C ))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))
C
      PROGRAM READ
C
      COMMON TCOM(4320)
C
      COMMON /IPRINT/IP(80)
      COMMON /MISC/ XMISC(100)
      COMMON /FDATT/ FDAT(60)
      COMMON /IFLOW/ IFL(13)
C
      DIMENSION ND(22),DUMMY(830),THF(300),RF(16),D(2400)
      DIMENSION ODSAVE(270),RATIO(284)
C
      EQUIVALENCE (RF(1),THF(285)),(DUMMY(1),D(1501))
C
      EQUIVALENCE (D(1),THF(1),TCOM(1),RATIO(1))
C
C
C        READ TITLE
C
   10 READ (5,112)(XMISC(N),N=85,100)
  112 FORMAT(8A10/8A10)
C
      IF(EOF(5))21,22
C
   21 CALL EXIT
C
C        READ PRINT INDICATORS
C
   22 READ(5,5000)(IP(N),N=1,80)
 5000 FORMAT(80I1)
C
C         READ LOADS PROGRAM INDICATORS AND PROGRAM FLOW INDICATORS
C
C****************-----READ WING/HORI/VERT ID FOR METAL OR ADV. COM. DESIGN*
C****************-----ID=0 FOR METAL, =1FOR ADV. COMP. DESIGN**************
C**************----COL 39-40= WING, 41-42 = HORI, 43-44= VERT---**********
C
C
      READ (5,3)(ND(I),I=1,22),(IFL(I),I=1,10)
    3 FORMAT (22I2,26X,.8I1)
C
C              ***SETUP METAL/COMPOSITE ID IN IFL(11,12,13)*****
      IFL(11) = ND(20)
      IFL(12) = ND(21)
      IFL(13) = ND(22)
C
C        STORE LOADS CONTROL DATA IN XMISC(51-69)
C
      DO 5 N=1,19
    5 XMISC(N+50) = ND(N)
C
      NCASE = XMISC(4) + 1.0
C
C        WRITE TITLE
C
      WRITE (6,203)(XMISC(N),N=85,100)
  203 FORMAT(1H1,10X,8A10/11X,8A10)
C
      WRITE(6,15)
   15 FORMAT(////20X,14HCONTROL CARD 1/)
C
      WRITE(6,16)
   16 FORMAT(19X,1H1,9X,1H2,9X,1H3,9X,1H4,9X,1H5,9X,1H6,9X,1H7,9X,
     *    1H8/10X,80H1234567890123456789012345678901234567890
     *1234567890123456789012345678901234567890)
```

CARD NO **** CONTENTS ****

```
      C
            WRITE(6,17)(IP(I),I=1,80)
         17 FORMAT(10X,80I1//)
      C
            WRITE(6,18)
         18 FORMAT(30X,14HCONTROL CARD 2/)
      C
            WRITE(6,18)
      C
            WRITE(6,19)(ND(L),L=1,82),(IFL(L),L=1,10)
         19 FORMAT(10X,82I2,30X,10I1)
      C
      C
      C        READ PERMANENT DATA WHEN XMISC(1) = 1.0 (FIRST CASE)
      C        OR WHEN IFL(10)=1
      C
            IF(XMISC(1) - 2.0)1,999,999
      C
        999 IF(IFL(10))999,999,998
      C
        998 REWIND 7
      C
            IP( 1) = 1
      C
            DO 3738 N = 1,50
       3738 XMISC(N) = 0.0
            XMISC(1) = 2.0
            XMISC(4) = NCASE - 1
            XMISC(48) = 1.0
      C
      C        CLEAR DATA REGION
      C
          1 DO 615 N=1,4320
        615 TCOM(N) = 0.0
      C
            DO 12 N=1,80
         12 FDAT(N) = 0.0
      C
      C        READ PERMANENT DATA ARRAYS
      C
      C        STORE LOADS ARRAYS (DT,DB,DF,DP,DS,DE,DI,DG,DR) IN RECORDS 1-9
      C        STORE PERMANENT GENERAL DATA IN RECORD 11
      C        STORE WF AND TEMPERATURE DATA IN RECORD 12
      C        STORE DATA FOR WING, HT AND VT IN RECORDS 23, 26 AND 27
      C        STORE DATA FOR FUSELAGE IN RECORD 24
      C        STORE DATA FOR LANDING GEAR IN RECORD 25
      C        STORE DATA FOR RAMPS AND DUCTS IN RECORD 28
      C        STORE AIRFOIL DATA IN RECORD 36
      C        STORE GJ DATA IN RECORD 37
      C
            N = 1
            MP = 0
            MDT = 1
      C
        500 CALL DECRD7(0)
      C
            GO TO (501,502,503,504,505,506,507,508,509,510,511,512,513,514,
           *       515,516,517),N
      C
        501 CALL WRITMS(1, D(1),96,1)
            LIM = 80
      C
            IF(IP( 1))700,705,525
        700 WRITE(6,708)
        708 FORMAT(1H1,10X,57H*** PERMANENT DATA (PRINT IN CASE 1 WHEN IP(1)
           *IS 0) ***////30X,38H*** LOADS ARRAY DT(96) - - RECORD 1 ***//)
            GO TO 520
      C
        502 CALL WRITMS(1, D(1),663,2)
            LIM =656
            IF(IP( 1))710,710,525
```

```
      710 WRITE(6,711)
      711 FORMAT(1HI,26X,48H*** LOADS ARRAY DB(853) - - RECORD 2 ***///)
          GO TO 520
C
      903 CALL WRITHS(1, D(1),148,3)
          LIN =150
          IF(IP( 1))715,715,525
      715 WRITE(6,716)
      716 FORMAT(1HI,26X,48H*** LOADS ARRAY DF(148) - - RECORD 3 ***///)
          GO TO 520
C
      904 CALL WRITHS(1, D(1),734,4)
          LIN =735
          IF(IP( 1))720,720,525
      720 WRITE(6,721)
      721 FORMAT(1HI,26X,48H*** LOADS ARRAY DP(734) - - RECORD 4 ***///)
          GO TO 520
C
      905 CALL WRITHS(1, D(1),288,5)
          LIN =290
          IF(IP( 1))725,725,525
      725 WRITE(6,726)
      726 FORMAT(1HI,26X,48H*** LOADS ARRAY DS(288) - - RECORD 5 ***///)
          GO TO 520
C
      906 CALL WRITHS(1, D(1),340,6)
          LIN =340
          IF(IP( 1))730,730,525
      730 WRITE(6,731)
      731 FORMAT(1HI,26X,48H*** LOADS ARRAY DE(340) - - RECORD 6 ***///)
          GO TO 520
C
      907 CALL WRITHS(1, D(1),60,7)
          LIN =60
          IF(IP( 1))735,735,525
      735 WRITE(6,736)
      736 FORMAT(1HI,26X,38H*** LOADS ARRAY DI(60) - - RECORD 7 ***///)
          GO TO 520
C
      908 CALL WRITHS(1, D(1),72,8)
          LIN =75
          IF(IP( 1))740,740,525
      740 WRITE(6,741)
      741 FORMAT(1HI,26X,38H*** LOADS ARRAY DG(72) - - RECORD 8 ***///)
          GO TO 520
C
      909 CALL WRITHS(1, D(1),108,9)
          LIN =110
          IF(IP( 1))745,745,525
      745 WRITE(6,746)
      746 FORMAT(1HI,26X,48H*** LOADS ARRAY DR(108) - - RECORD 9 ***///)
          GO TO 520
C
      910 CALL WRITHS(1,D(1),2060,23)
C
          LIN = 2060
          IF(IP( 1))750,750,532
      750 WRITE(6,751)
      751 FORMAT(1HI,24X,49H*** PERMANENT DATA FOR WING - - RECORD 23 ***///)
          GO TO 520
C
      911 CALL WRITHS(1,D(1),2000,24)
C
          LIN = 2000
          IF(IP( 1))781,781,525
      781 WRITE(6,783)
      783 FORMAT(1HI,22X,49H*** PERMANENT DATA FOR FUSELAGE - - RECORD 24 **
         **///)
          GO TO 520
C
      912 CALL WRITHS(1,D(1),110,25)
```

CARD NO **** CONTENTS ****

```
C
      LIM = 116
      IF(IP( 1))770,770,525
  770 WRITE(6,771)
  771 FORMAT(1H1,21X,52H***PERMANENT DATA FOR LANDING GEAR - - RECORD 25
     * ***//)
      GO TO 520
C
  513 DO 37 I=1,83
   37 D(I+420) = D(I+840)
C
      CALL WRITMS(1,D(1),2000,20)
C
      DO 38 I=771,1700
   38 D(I) = 0.0
      LIM = 770
      IF(IP( 1))781,781,525
  781 WRITE(6,782)
  782 FORMAT(1H1,16X,61H*** PERMANENT DATA FOR AIR INDUCTION SYSTEM - -
     *RECORD 20 ***//)
      GO TO 520
C
  514 CALL WRITMS(1,D(1),312,12)
C
      LIM = 312
      IF(IP( 1))791,791,525
  791 WRITE(6,792)
  792 FORMAT(1H1,17X,58H*** PERMANENT DATA FOR VF AND TEMPERATURE - - RE
     *CORD 12 ***//)
      GO TO 520
C
  515 CALL WRITMS(1,D(1),1606,11)
C
      XMISC(37) = D(28)
      XMISC(38) = D(33)
C
      LIM = 1606
      IF(IP( 1))785,785,525
  785 WRITE(6,786)
  786 FORMAT(1H1,25X,44H*** PERMANENT GENERAL DATA - - RECORD 11 ***//)
      GO TO 520
C
  516 CALL WRITMS(1,D(1),500,36)
      LIM = 500
C
      IF(IP( 1))756,756,525
  756 WRITE(6,783)
  783 FORMAT(1H1,30X,34H*** AIRFOIL DATA - - RECORD 36 ***//)
      GO TO 520
C
  517 CALL WRITMS(1,D(1),100,37)
C
      LIM = 100
      IF(IP( 1))760,760,525
  760 WRITE(6,784)
  784 FORMAT(1H1,32X,29H*** GJ DATA - - RECORD 37 ***//)
      GO TO 520
C
  520 DO 521 I=1,LIM,5
      IF(ABS( D(I)) + ABS( D(I+1)) + ABS( D(I+2)) + ABS( D(I+3))
     *    + ABS( D(I+4)))521,521,523
  523 WRITE(6,522)I, D(I), D(I+1), D(I+2), C(I+3), D(I+4)
  522 FORMAT(1H ,I4,5E18.8)
  521 CONTINUE
C
      GO TO(7700,7705,535),INDT
C
 7700 IF(N - 10)536,532,536
C
  532 CALL DECRD7(D)
      CALL WRITMS(1,D(1),2060,28)
```

CARD NO **** CONTENTS ****

```
      IF(IP(1))7701,7701,7705
 7701 WRITE(6,7702)
 7702 FORMAT(1H1,18X,58H*** PERMANENT DATA FOR HORIZONTAL TAIL - - RECOR
     *D 25 ***//)
      INDT = 2
      GO TO 520
C
 7705 CALL READMS(1,D(1),2050,23)
      CALL DECRD7(D)
      CALL WRITMS(1,D(1),2050,27)
C
      IF(IP(1))7706,7706,535
 7706 WRITE(6,7707)
 7707 FORMAT(1H1,18X,54H*** PERMANENT DATA FOR VERTICAL TAIL - - RECORD
     *27 ***//)
      INDT = 3
      GO TO 520
C
  535 IF(NP)525,525,95
C
  525 DO 530 I=1,LIM
  530 D(I) = 0.0
C
      IF(N-12)8503,8502,8503
C
 8502 READ(7,35)(D(I),I=771,1700)
   35 FORMAT(20A4)
C
 8503 N = N + 1
C
      IF(N - 18)500,510,510
C
C     INITIALIZE RECORDS   29,32,33,34,17,21 AND 38
C
  510 CALL WRITMS(1,D(1),2400,29)
      CALL WRITMS (1,D(1),100,32)
      CALL WRITMS(1,D(1),672,33)
      CALL WRITMS(1,D(1),480,34)
      CALL WRITMS(1,D(1),200,21)
      CALL WRITMS (1,D(1),50,38)
C
      DO 515 N=1,204
  515 RATIO(N) = 1.0
      CALL WRITMS(1,RATIO(1),204,17)
C
C
C
C       READ MATERIAL PROPERTIES (20 MAXIMUM)
C       STORE IN RECORDS 41-60
C       STORE NMATL IN XH(9C(1)
C
      NP = 1
C
  110 NMATL = 0
C
   31 DO 30 I=1,300
      THF(I) = 0.0
   30 CONTINUE
C
      READ(7,50)MF
   50 FORMAT(8A10/8A10)
C
      CALL DECRD7(THF)
C
      IF(THF(1)) 32,33,32
C
   32 NMATL = NMATL + 1
      IR = NMATL + 40
C
      IF(IP( 1))91,91,95
C
```

CARD NO **** CONTENTS ****

```
      91 WRITE(6,92)NMATL,IR,RF
      92 FORMAT(1H1,27X,19H*** MATERIAL NUMBER,,I3,11H - - RECORD,I3,4H ***/
     * / 7X,8A10/ 7X,8A10//)
        LIM = 200
        GO TO 920
C
      98 CALL WRITHS(1,THF(1),300,IR)
        GO TO 31
C
      33 XMISC( 1) = NMATL
C
C
C
C
C
  900 READ(5,999)DNAME
  999 FORMAT(A10)
C
  995 DO 1000 N=1,12
        IF(DNAME - XMISC(N+69))1000,1010,1000
 1010 IND = N
        GO TO 1020
 1000 CONTINUE
C
        WRITE(6,1030)DNAME
 1030 FORMAT(1H1,23H*** BAD TITLE CARD --- ,A10,4H ***)
C
        CALL DECRD(ID)
C
        DO 1031 N=1,2400
 1031 D(N) = 0.0
        GO TO 900
C
 1020 GO TO(1110,1120,1130,1140,1150,1160,1170,1180,1190,1195,1205,
     * 1500),IND
C
 1110 NR = 11
        LIM = 1605
        XMISC(40) = 0.0
C
        IF(IP( 2))1111,1111,1200
 1111 WRITE(6,1112)
 1112 FORMAT(1H1,30X,3HX** GENERAL DATA - - RECORD 11 ***//)
        GO TO 1200
C
 1120 NR = 23
        LIM = 2060
        IF(IP( 2))1121,1121,1200
 1121 WRITE(6,1122)
 1122 FORMAT(1H1,31X,31H*** WING DATA - - RECORD 23 ***//)
        GO TO 1200
C
 1130 NR = 26
        LIM = 2060
        IF(IP( 2))1131,1131,1200
 1131 WRITE(6,1132)
 1132 FORMAT(1H1,25X,42H*** HORIZONTAL TAIL DATA - - RECORD 26 ***//)
        GO TO 1200
C
 1140 NR = 27
        LIM = 2060
        IF(IP( 2))1141,1141,1200
 1141 WRITE(6,1142)
 1142 FORMAT(1H1,27X,40H*** VERTICAL TAIL DATA - - RECORD 27 ***//)
        GO TO 1200
C
 1150 NR = 24
        LIM = 2000
        IF(IP( 2))1151,1151,1200
 1151 WRITE(6,1152)
 1152 FORMAT(1H1,30X,35H*** FUSELAGE DATA - - RECORD 24 ***//)
```

CARD NO **** CONTENTS ****

```
      GO TO 1200
C
 1160 NR = 25
      LIM = 116
      IF(IP( 2))1161,1161,1200
 1161 WRITE(6,1162)
 1162 FORMAT(1H1,27X,39H*** LANDING GEAR DATA - - RECORD 25 ***//)
      GO TO 1200
C
 1170 NR = 28
      LIM = 2000
      IF(IP( 2))1171,1171,1200
 1171 WRITE(6,1172)
 1172 FORMAT(1H1,23X,47H*** AIR INDUCTION SYSTEM DATA - - RECORD 28 ***/
     * /)
      GO TO 1200
C
 1180 NR = 29
      LIM = 2400
      IF(IP( 2))1181,1181,1200
 1181 WRITE(6,1182)
 1182 FORMAT(1H1,30X,34H*** FATIGUE DATA - - RECORD 29 ***//)
      GO TO 1200
C
 1190 NR = 32
      LIM = 198
      IF(IP( 2))1191,1191,1200
 1191 WRITE(6,1192)
 1192 FORMAT(1H1,19X,57H*** WING, HORIZONTAL AND VERTICAL LOADS - - RECO
     *RD 32 ***//)
      GO TO 1200
C
 1195 NR = 33
      LIM = 672
      IF(IP( 2))1196,1196,1200
 1196 WRITE(6,1197)
 1197 FORMAT(1H1,29X,38H*** FUSELAGE LOADS - - RECORD 33 ***//)
      GO TO 1200
C
 1205 NR = 34
      LIM = 480
      IF(IP( 2))1206,1206,1200
 1206 WRITE(6,1207)
 1207 FORMAT(1H1, 8X,79H*** FUSELAGE INERTIA, WEIGHT DISTRIBUTION AND PR
     *ESSURE TABLES - - RECORD 34 ***///)
      GO TO 1200
C
 1200 CALL READMS(1,D(1),LIM,NR)
      CALL DECRD(D)
C
      GO TO(1231,1232,1233,1234,1235,1236,1250,1238,1250,1250,1250),IND
C
 1231 XMISC(35) = D(740)
      XMISC(36) = D(741)
C
      DO 400 N=1,270
  400 GDSAVE(N) = 0.0
C
      GDSAVE(1) = D(1081)
      GDSAVE(2) = D(1082)
      GDSAVE(3) = D(781)
      DO 402 N=4,72
  402 GDSAVE(N) = D(N+1082)
      GDSAVE(73) = D(735)
      GDSAVE(74) = D(731)
      GDSAVE(75) = D(1202)
      GDSAVE(76) = D(1201)
      GDSAVE(77) = D(1271)
      GDSAVE(78) = D(1287)
      GDSAVE(79) = D(1281)
      GDSAVE(80) = D(1282)
```

CARD NO **** CONTENTS ****

```
      GDSAVE(81) = D(1299)
      GDSAVE(82) = D(1300)
      DO 403 N=83,108
  403 GDSAVE(N) = D(N+1078)
      DO 404 N=109,128
  404 GDSAVE(N) = D(N+1102)
      DO 405 N=129,158
  405 GDSAVE(N) = D(N+1112)
      DO 406 N=159,166
  406 GDSAVE(N) = D(N+1115)
      DO 407 N=167,176
  407 GDSAVE(N) = D(N+1134)
      DO 408 N=177,206
  408 GDSAVE(N) = D(N+1154)
      DO 409 N=207,238
  409 GDSAVE(N) = D(N+544)
      GDSAVE(239) = D(1187)
      GDSAVE(240) = D(1188)
      GDSAVE(241) = D(1189)
      GDSAVE(242) = D(1190)
      GDSAVE(243) = D(957)
      GDSAVE(244) = D(961)
      GDSAVE(245) = D(709)
      IF(D(708)) 425,425,427
C        HORIZONTAL TAIL IS ON FUSELAGE
  425 GDSAVE(246) = D(1007)
      GDSAVE(247) = D(1011)
      GDSAVE(248) = D(704)
      GDSAVE(263) = D(2)*(D(1001)/D(1002))**.5/(D(1) + D(1003))*D(12)
      IF(D(1030)) 426,426,427
  426 GDSAVE(263) = GDSAVE(263)*(D(1) - (D(1) - D(1003))*D(1007)/
     1 (D(1001)*D(1002))**.5/D(6))
  427 GDSAVE(249) = D(1047)
      GDSAVE(250) = D(1051)
      GDSAVE(251) = D(705)
      GDSAVE(252) = D(747)
      GDSAVE(253) = D(746)
      GDSAVE(254) = D(749)
      GDSAVE(255) = D(748)
      GDSAVE(256) = D(944)
      GDSAVE(257) = D(861)
      IF(D(1161)) 428,428,429
  428 GDSAVE(258) = D(1167)
      GDSAVE(259) = D(1171)
      N = D(1202)
      GDSAVE(260) = D(1173) + D(N+1210)
      GDSAVE(261) = D(1170)
      GDSAVE(266) = D(1168)
  429 GDSAVE(262) = D(2)*(D(951)/D(952))**.5/(D(1) + D(953))*D(12)
      GDSAVE(262) = GDSAVE(262)*(D(1) - (D(1) - D(953))*D(957)/
     1 (D(951)*D(952))**.5/D(6))
      GDSAVE(264) = D(2)*(D(1041)/D(1042))**.5/(D(1) + D(1043))*D(12)
      GDSAVE(265) = D(962)
C
      GO TO 1250
C
 1232 D(289) = 0.0
      XMISC(15) = D(258)
C
      GO TO 1250
C
 1233 D(289) =-1.0
      XMISC(19) = D(258)
C
      GO TO 1250
C
 1234 XMISC(23) = D(258)
      GO TO 1250
C
 1235 XMISC(3) = D(246)
      XMISC(4) = D(249)
```

```
CARD NO  ****                          CONTENTS                          ****
     968          GO TO 1250
     969      C
     970       1235 WRITE(2+) = D(+6)
     971          GO TO 1250
     972      C
     973       1238 CALL WRITMS(1,DUMMY(1),630,35)
     974          GO TO 1250
     975      C
     976       1250 IF(IP( 2))1210,1210,1230
     977      C
     978       1210 IF(IND - 7)1252,1251,1252
     979      C
     980       1251 LIN = 770
     981      C
     982       1252 DO 1211 N=1,LIN,5
     983            IF(ABS(D(N)) + ABS(D(N+1)) + ABS(D(N+2)) + ABS(D(N+3))
     984           +          + ABS(D(N+4)))1211,1211,1212
     985       1212 WRITE(6,5221N,D(N),D(N+1),D(N+2),D(N+3),D(N+4)
     986       1211 CONTINUE
     987      C
     988       1230 IF(IND - 7)1260,1263,1260
     989      C
     990       1263 LIN = 2000
     991      C
     992       1260 CALL WRITMS(1,D(1),LIN,NR)
     993      C
     994            IF(IND - 1)1280,1270,1280
     995      C
     996      C       IF LOCATION 1401 IN THE GENERAL DATA IS GIVEN, READ RECORD 9
     997      C       AND PLACE THE DATA IN LOCATIONS 1401-1440 OF THE GENERAL DATA
     998      C        IN THE RECORD 9 LOCATIONS INDICATED BY ND(1), THE A/V CLASS
     999      C        INDICATOR.
    1000      C
    1001       1270 IF(D(1401))1275,1275,1272
    1002      C
    1003       1272 CALL READMS(1,D(1),288,9)
    1004      C
    1005            LOC = (ND(1) - 1) * 40
    1006            ND51 = LOC + 1
    1007            ND52 = LOC + 40
    1008      C
    1009            DO 1274 N=1,40
    1010            D(N+LOC) = D(N+1400)
    1011       1274 D(N+1400) = 0.0
    1012      C
    1013            CALL WRITMS(1,D(1),288,9)
    1014      C
    1015            WRITE(6,3560)ND51,ND52
    1016      C
    1017       3500 FORMAT(1H1,14X,60HTHE DATA IN LOCATIONS 1401-1440 IN THE VARIABLE
    1018           *OF/NERAL DATA/
    1019           *           15X,28H HAS BEEN PLACED IN LOCATIONS ,13,1H-,13,23H IN A
    1020           *RRAY OS (RECORD 9))
    1021      C
    1022      C       * * PUT DUPLICATED DATA IN FUSELAGE AND AIS DATA ARRAYS * *
    1023      C
    1024       1275 CALL READMS(1,D(1),2000,2
    1025      C
    1026            D(293) = GDSAVE(1)
    1027            D(294) = GDSAVE(2)
    1028            D(295) = GDSAVE(3)
    1029            DO 410 N=291,340
    1030       410 D(N) = GDSAVE(N-287)
    1031            DO 411 N=351,370
    1032       411 D(N) = GDSAVE(N-307)
    1033            D(1005) = GDSAVE(293)
    1034            D(1006) = GDSAVE(294)
    1035            D(1007) = GDSAVE(295)
    1036            D(1010) = GDSAVE(296)
    1037            D(1011) = GDSAVE(297)
    1038            D(1012) = GDSAVE(298)
```

CARD NO **** CONTENTS ****

```
      D(1015) = GOSAVE(249)
      D(1016) = GOSAVE(250)
      D(1017) = GOSAVE(251)
      D(1026) = GOSAVE(252)
      D(1032) = GOSAVE(253)
      D(1035) = GOSAVE(254)
      D(1038) = GOSAVE(255)
      DO 440 N=1041,1051
  440 D(N) = GOSAVE(N-785)
C
      CALL WRITMS(1,D(1),2000,24)
C
      CALL READMS(1,D(1),2000,28)
C
      D(316) = GOSAVE(73)
      D(317) = GOSAVE(74)
      D(321) = GOSAVE(75)
      D(322) = GOSAVE(76)
      D(401) = GOSAVE(77)
      D(417) = GOSAVE(78)
      D(522) = GOSAVE(79)
      D(521) = GOSAVE(80)
      D(529) = GOSAVE(81)
      D(530) = GOSAVE(82)
      DO 412 N=281,306
  412 D(N) = GOSAVE(N-198)
      DO 413 N=331,350
  413 D(N) = GOSAVE(N-222)
      DO 414 N=361,390
  414 D(N) = GOSAVE(N-232)
      DO 415 N=404,411
  415 D(N) = GOSAVE(N-245)
      DO 416 N=531,540
  416 D(N) = GOSAVE(N-364)
      DO 417 N=561,590
  417 D(N) = GOSAVE(N-384)
      DO 418 N=601,632
  418 D(N) = GOSAVE(N-394)
      DO 442 N=307,310
  442 D(N) = GOSAVE(N-68)
C
      CALL WRITMS(1,D(1),2000,28)
C
      LIM = 2000
C
 1280 DO 1251 N=1,LIM
 1251 D(N) = 0.0
C
      GO TO 990
C
C
 1500 CONTINUE
C
      END
C
C ((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((
C                          SUBROUTINE DECRD
C )))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))).)))
C
      SUBROUTINE DECRD(V)
      DIMENSION V(1),T(5),A(10)
      DATA BLANK/6H      /
    5 READ(5,1)IND,(T(N),N=1,5),(A(N),N=1,10)
    1 FORMAT(T1,I12,T13,5F12.0,T13,10A6)
      IF(EOF(5))21,22
   21 CALL EXIT
C
   22 IF(IND)7,8,7
C
    8 WRITE(6,9)     (A(N),N=1,10)
    9 FORMAT(/17H NO DECK LOCATION,5X,10A6/)
```

```
      GO TO 5
C
    7 DO 2 N=1,5
      NN = 2*N - 1
      IF(A(NN) - BLANK)3,11,3
   11 IF(A(NN+1) - BLANK)3,2,3
    3 III = IABS(IND) + N - 1
      V(III) = T(N)
    2 CONTINUE
      IF(IND)6,5,5
    6 RETURN
      END
C
C ((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((
C                          SUBROUTINE DECRD7
C ))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))
C
      SUBROUTINE DECRD7(V)
      DIMENSION V(1),T(5),A(10)
      DATA BLANK/8H        /
    5 READ(7,1)IND,(T(N),N=1,5),(A(N),N=1,10)
    1 FORMAT(T1,I12,T13,5F12.0,T13,10A6)
      IF(EOF(7))21,22
   21 CALL EXIT
C
   22 IF(IND)7,8,7
C
    8 WRITE(6,9)    (A(N),N=1,10)
    9 FORMAT(/17H NO DECK LOCATION,5X,10A6/)
      GO TO 5
C
    7 DO 2 N=1,5
      NN = 2*N - 1
      IF(A(NN) - BLANK)3,11,3
   11 IF(A(NN+1) - BLANK)3,2,3
    3 III = IABS(IND) + N - 1
      V(III) = T(N)
    2 CONTINUE
      IF(IND)6,5,5
    6 RETURN
      END
```

Section VI

FINAL OUTPUT MODULE

PROGRAM DESCRIPTION

The function of the final output module is to present the summary results of SWEEP weight analysis modules. It also prints initial weight assumptions, geometry, and structural design data.

This module consists of a single routine, OUTPUT. Data are transferred to this module through the labeled common block, FDATT, and mass storage file records 11 and 19. File records 11 and 19 are used to transfer data from the data management module, and to organize common as it existed in that module. Detail discussions of common arrangement and the methods and formulations used to calculate these common region variables are presented in part 2 of this volume.

PROGRAM OUTPUT

General Description

Deck name: OUTPUT
Entry name: OVERLAY (5HALPHA, 13, 0)
Called by: OLAY00
Subroutines called: None

This routine prints the initial weight and balance assumptions (Figures 11 and 12), group weight summary of results from the weight analysis modules and final vehicle weight and balance estimates (Figures 13 and 14), and dimensional and structural data (Figure 15).

Mass storage file records 11 and 19 are read into common. These records provide vehicle geometry and design data from the data management module. Record 11 consists of the input design data, and record 19 consists of data calculated in the data management module.

Labeled common block FDATT contains structural weight results from the weight analysis modules. Should any of the component weight data be missing in this block, the corresponding weight analysis module was not executed. When the calculated weight details are not available, the initial assumed structure weight is used to calculate final vehicle weight and balance.

INITIAL WEIGHT AND BALANCE DATA

	WEIGHT	HORIZ. ARM
WEIGHT EMPTY	127644.01	953.07
WING	35648.92	982.76
HORIZONTAL	3658.32	1847.43
VERTICAL	2165.62	1750.99
BODY	27565.33	1062.30
MAIN GEAR	8136.67	922.72
NOSE GEAR	847.94	356.58
SURFACE CONTROLS	3714.00	1121.80
ENGINE SECTION	6112.25	796.53
OTHER STRUCTURE	0.00	0.00
ENGINE	18759.00	774.10
ACCESSORY GEAR BOXES	0.00	0.00
AIR INDUCTION SYSTEM	828.97	699.04
AIS ACTUATION AND CONTROLS	0.00	0.00
EXHAUST SYSTEM	3577.00	845.67
COOLING AND DRAINS	144.00	803.90
LUBRICATING SYSTEM	212.00	840.80
FUEL SYSTEM	1380.00	953.40
ENGINE CONTROLS	236.00	666.20
STARTING SYSTEM	320.00	768.30
AUXILIARY POWER UNIT	554.00	844.70
INSTRUMENTS	1122.00	545.00
HYDRAULIC	1489.00	881.90
ELECTRICAL	2650.00	657.50
ELECTRONICS	2347.00	592.40
ARMAMENT	0.00	0.00
FURNISHINGS	3320.00	596.80
AIR CONDITIONING	2648.00	809.90
PHOTOGRAPHIC	0.00	0.00
AUXILIARY GEAR	95.00	1228.00
OTHER EQUIPMENT	113.00	300.00

Figure 11. Sample output of initial weight empty balance data.

I N I T I A L W E I G H T A N D B A L A N C E D A T A

USEFUL LOAD AND GROSS WEIGHT

LOAD CONDITION	MAXIMUM DESIGN WEIGHT		FLIGHT DESIGN GROSS WEIGHT		LANDING DESIGN GROSS WEIGHT	
	WEIGHT	ARM	WEIGHT	ARM	WEIGHT	ARM
CREW (NO. 4.0)	860.0	351.30	860.0	351.30	860.0	351.30
FUEL						
UNUSABLE	2164.0	1001.90	2164.0	1001.9	2164.0	1001.90
INTERNAL	67640.0	858.00	65740.0	858.00	28090.0	858.00
	49040.0	1047.34	49040.0	1047.34	28090.0	1047.34
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
OIL	416.0	753.61	416.0	753.61	416.0	753.61
FUSELAGE PAYLOAD	70000.0	887.00	70000.0	887.00	70000.0	887.00
WING PAYLOAD	0.0	0.00	0.0	0.0	0.0	0.00
ARMAMENT						
GUNS (QTY. 0.0)	0.0	0.00	0.0	0.00	0.0	0.00
AMMUNITION	0.0	0.00	0.0	0.00	0.0	0.00
INSTALLATIONS (PYLONS RACKS ETC.)						
WING	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.0	0.0	0.00
FUSELAGE	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
EQUIPMENT						
OXYGEN, LN2	0.0	0.00	0.0	0.0	0.0	0.00
MISCELLANEOUS	236.0	852.97	236.0	852.9	236.0	852.97
USEFUL LOAD	190356.0	916.55	188456.0	917.15	129856.0	913.29
WEIGHT EMPTY	127644.0	953.07	127644.0	953.07	127644.0	953.07
GROSS WEIGHT	318000.0	931.21	316100.0	931.6	257500.0	933.01

Figure 12. Sample output of initial weight and balance summary.

GROUP WEIGHT STATEMENT

WEIGHT EMPTY BALANCE DATA

	WEIGHT	HORIZ. ARM
WEIGHT EMPTY	118880.85	924.11
WING	31429.25	956.38
HORIZONTAL	2350.93	1844.93
VERTICAL	2170.23	1745.39
BODY	26749.71	972.27
MAIN GEAR	8366.47	991.77
NOSE GEAR	674.77	354.75
SURFACE CONTROLS	3714.00	1121.80
ENGINE SECTION	3847.99	825.52
OTHER STRUCTURE	0.00	0.00
ENGINE	18759.00	774.10
ACCESSORY GEAR BOXES	0.00	0.00
AIR INDUCTION SYSTEM	611.50	698.51
AIS ACTUATION AND CONTROLS	0.00	0.00
EXHAUST SYSTEM	3577.00	845.67
COOLING AND DRAINS	144.00	803.90
LUBRICATING SYSTEM	212.00	840.80
FUEL SYSTEM	1380.00	953.40
ENGINE CONTROLS	236.00	666.20
STARTING SYSTEM	320.00	768.30
AUXILIARY POWER UNIT	554.00	844.70
INSTRUMENTS	1122.00	545.00
HYDRAULIC	1489.00	881.90
ELECTRICAL	2650.00	657.50
ELECTRONICS	2347.00	592.40
ARMAMENT	0.00	0.00
FURNISHINGS	3320.00	596.80
AIR CONDITIONING	2648.00	809.90
PHOTOGRAPHIC	0.00	0.00
AUXILIARY GEAR	95.00	1228.00
OTHER EQUIPMENT	113.00	300.00

Figure 13. Sample output of final weight empty balance data.

GROUP WEIGHT STATEMENT

WEIGHT EMPTY

WING GROUP					31429.2
CENTER SECTION - BASIC STRUCTURE				2237.0	
OUTER PANEL - BASIC STRUCTURE(INCL. TIPS 39.9 LBS.)				25308.9	
PIVOT				0.0	
AILERONS				743.3	
FLAPS - TRAILING EDGE				2414.8	
FLAPS - LEADING EDGE				0.0	
SLATS				0.0	
SPOILERS				725.3	
MISCELLANEOUS				712.0	
HORIZONTAL TAIL GROUP					2350.9
CENTER SECTION/SPINDLE				0.0	
STABILIZER - BASIC STRUCTURE				1832.4	
ELEVATOR				518.6	
MISCELLANEOUS				46.1	
VERTICAL TAIL GROUP					2170.2
CENTER SECTION/SPINDLE				0.0	
FINS - BASIC STRUCTURE				1898.8	
RUDDER				271.5	
MISCELLANEOUS				63.2	
BODY GROUP					26749.7
FUSELAGE BASIC STRUCTURE				19013.3	
SECONDARY STRUCTURE - FUSELAGE				1138.6	
- DOORS, PANELS, AND MISC.				6597.8	
ALIGHTING GEAR GROUP					9041.2
LOCATION	WHEELS, BRAKES TIRES, TUBES	STRUCTURE	CONTROLS		
FUSELAGE - MAIN GEAR	3303.2	2239.7	2823.6	8366.5	
FUSELAGE - NOSE GEAR	317.1	150.5	207.2	674.8	
SURFACE CONTROLS GROUP					3714.0
ENGINE SECTION					3848.0
INBOARD				1907.0	
CENTER					
OUTBOARD				1912.2	
DOORS, PANELS, AND MISC.				28.5	
STRUCTURE - OTHER AND MISC.					0.0

Figure 14. Sample output of group weight statement.

TOTAL (TO BE BROUGHT FORWARD)			79303.3

GROUP WEIGHT STATEMENT

WEIGHT EMPTY

PROPULSION GROUP			25239.5
ENGINE INSTALLATION		18759.0	
ACCESSORY GEAR BOXES AND DRIVES		0.0	
AIR INDUCTION SYSTEM		611.5	
STRUCTURE	611.5		
ACTUATION AND CONTROLS	0.0		
EXHAUST SYSTEM		3577.0	
COOLING SYSTEM AND DRAIN PROVISIONS		144.0	
LUBRICATING SYSTEM		212.0	
FUEL SYSTEM		1380.0	
ENGINE CONTROLS		236.0	
STARTING SYSTEM		320.0	
AUXILIARY POWER PLANT GROUP			554.0
INSTRUMENTS GROUP			1122.0
HYDRAULICS AND PNEUMATICS GROUP			1449.0
ELECTRICAL GROUP			2650.0
ELECTRONICS GROUP			2347.0
ARMAMENT GROUP			0.0
FURNISHINGS AND EQUIPMENT GROUP			3320.0
AIR CONDITIONING AND ANTI-ICING EQUIPMENT GROUP			2648.0
PHOTOGRAPHIC GROUP			0.0
AUXILIARY GEAR GROUP			95.0
OTHER EQUIPMENT AND MISC.			113.0
TOTAL FROM PREVIOUS PAGE			79303.3
WEIGHT EMPTY			119880.8

Figure 14. Sample output of group weight statement (cont).

GROUP WEIGHT STATEMENT

USEFUL LOAD AND GROSS WEIGHT

LOAD CONDITION	MAXIMUM DESIGN WEIGHT		FLIGHT DESIGN GROSS WEIGHT		LANDING DESIGN GROSS WEIGHT	
	WEIGHT	ARM	WEIGHT	ARM	WEIGHT	ARM
CREW (NO. 4.0)	860.0	351.30	860.0	351.30	860.0	351.30
FUEL						
UNUSABLE	2164.0	1001.90	2164.0	1001.9	2164.0	1001.90
INTERNAL	67640.0	858.00	65740.0	858.00	28090.0	858.00
	49040.0	1047.34	49040.0	1047.34	28090.0	1047.34
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.0	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.0	0.0	0.00
OIL	416.0	753.61	416.0	753.6	416.0	753.61
FUSELAGE PAYLOAD	70000.0	887.00	70000.0	887.00	70000.0	887.00
WING PAYLOAD	0.0	0.00	0.0	0.00	0.0	0.00
ARMAMENT						
GUNS (QTY. 0.0)	0.0	0.00	0.0	0.00	0.0	0.00
AMMUNITION	0.0	0.00	0.0	0.00	0.0	0.00
INSTALLATIONS (PYLONS RACKS ETC.)						
WING	0.0	0.00	0.0	0.0	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
FUSELAGE	0.0	0.00	0.0	0.00	0.0	0.00
	0.0	0.00	0.0	0.00	0.0	0.00
EQUIPMENT						
OXYGEN, LN2	0.0	0.00	0.0	0.00	0.0	0.00
MISCELLANEOUS	236.0	852.97	236.0	852.97	236.0	852.97
USEFUL LOAD	190356.0	916.55	188456.0	917.15	129856.0	913.29
WEIGHT EMPTY	118880.8	924.11	118880.8	924.11	118880.8	924.11
GROSS WEIGHT	309236.8	919.46	307336.8	919.8	248736.9	918.46

Figure 14. Sample output of group weight statement (concl).

GROUP WEIGHT STATEMENT

DIMENSIONAL AND STRUCTURAL DATA

LENGTH - OVERALL (FT.) 141.53

HEIGHT - OVERALL - STATIC (T.) 38.55

	FUSELAGE	INBOARD	NACELLES CENTER	OUTBOARD
LENGTH - MAX. (FT.)	132.29	16.60		16.60
DEPTH - MAX. (FT.)	14.17	5.50		5.50
WIDTH - MAX. (FT.)	14.17	5.50		5.50
WETTED AREA (SQ. FT.)	4972.76	277.19		277.19
FUSELAGE VOLUME (CU. FT.)	16020.63			

	WING	H. TAIL	V. TAIL
GROSS AREA (SQ. FT.)	3002.83	483.00	416.00
WEIGHT/GROSS AREA (LBS./SQ. FT.)	10.47	4.87	5.22
SPAN (FT.)	159.95	50.35	22.72
SWEEPBACK - AT .25C (DEGREES)	25.92	25.00	35.00
THEORETICAL ROOT CHORD - LENGTH (INCHES)	317.87	168.08	273.11
- MAX. THICKNESS (INCHES)	51.90	17.65	35.50
THEORETICAL TIP CHORD - LENGTH (INCHES)	132.70	62.17	166.30
- MAX. THICKNESS (INCHES)	13.27	6.53	21.62
TAIL LENGTH - .25 MAC WING TO .25 MAC H. TAIL (FT.)		74.20	

ALIGHTING GEAR	NOSE	MAIN
LENGTH - OLEO EXTENDED - AXLE TO TRUNNION (INCHES)	41.50	61.70
OLEO TRAVEL - FULL EXTENDED TO FULL COLLAPSED (INCHES)	12.00	28.00

STRUCTURAL DATA - CONDITION	STRESS GROSS WEIGHT	LIMIT LOAD FACTOR
FLIGHT	316100.00	2.50
LANDING	257500.02	
TAKE-OFF	318000.01	
LIMIT AIRPLANE LANDING SINK SPEED (FT./SEC.)		10.00
WING LIFT ASSUMED FOR LANDING DESIGN CONDITION (PERCENT WT.)		100.00
STALL SPEED - LANDING CONFIGURATION - POWER OFF (KNOTS)		103.00
PRESSURIZED CABIN - ULT. DESIGN PRESSURE DIFFERENTIAL - FLIGHT (P.S.I)		18.47

Figure 15. Sample output of dimensional and structural data.

Arrays and Variables Used

DATN(2)	Number of cuts through nacelle
DATN(11)-DATN(20)	X-station nacelle cuts referenced from leading edge station, in.
DATN(41)-DATN(50)	Nacelle depth at nacelle cuts, in.
DATN(51)-DATN(60)	Nacelle width at nacelle cuts, in.
DATS(1)	Number of nacelles
DVH(5)	Horizontal tail root chord, in.
DVH(6)	Horizontal tail taper ratio
DVH(8)	Horizontal tail planform area, ft^2
DVH(9)	Horizontal tail span, ft
DVH(23)	Sweep of horizontal tail quarter chord, deg
DVH(26)	X-station of horizontal tail quarter chord at mean aerodynamic chord, in.
DVV(22)	Sweep of vertical tail quarter chord, deg
DVV(23)	Number of vertical tails
DVV(27)	Z-station of vertical tail tip, in.
DVV(28)	X-station of vertical tail trailing edge at tip, in.
DVV(29)	Vertical tail span, ft.
DVV(30)	Vertical tail root chord, in
DVW(43)	X-station of wing quarter chord at mean aerodynamic chord (nominal position), in.
DVW(45)	Wing semispan (nominal position), in.
DVW(48)	Wing root chord (nominal position), in.
DVW(49)	Wing tip chord (nominal position), in.
DVW(50)	Sweep of wing quarter chord (nominal position), deg
DVWT	Weight data, refer to Table 15.
GDD(11)	Maximum positive maneuver load factor, subsonic, at BFDW.
EDD(12)	Maximum positive maneuver load factor, supersonic at BFDW
GDD(18)	Minimum speed, flaps down, at LDW, knots
GDD(20)	Design sink speed at LDW, ft/sec
GDD(21)	Main landing gear stroke, fully extended to fully compressed, in.
GDD(22)	Nose landing gear stroke, fully extended to fully compressed, in.
GDD(23)	Main landing gear length with oleo extended, axle to trunnion centerline, in.
GDD(24)	Nose landing gear length with oleo extended, axle to trunnion centerline, in.
GDD(28)	Ground line Z-station at main gear, in.
GDH(12)	Horizontal tail thickness ratio at root
GDH(13)	Ratio of horizontal tail thickness ratio at tip to thickness ratio at root

TABLE 15. DVWT WEIGHT DATA ARRAY VARIABLES IN OUTPUT MODULE

Loc	Description
1	Wing weight, lb
2	Horizontal tail weight, lb
3	Vertical tail weight, lb
4	Fuselage weight, lb
5	Main landing gear weight, lb
6	Nose landing gear weight, lb
7	Surface controls weight, lb
8	Engine section and nacelle weight, lb
9	Other structure weight, lb
10	Engine weight, lb
11	Auxiliary gearboxes and drive weight, lb
12	Air induction system structure weight, lb
13	Air induction system actuators and controls weight, lb
14	Exhaust system weight, lb
15	Cooling and drains weight, lb
16	Lubrication system weight, lb
17	Fuel system weight, lb
18	Engine controls weight, lb
19	Starting system weight, lb
20	Auxiliary power unit weight, lb
21	Instruments weight, lb
22	Hydraulics weight, lb
23	Electrical weight, lb
24	Electronics weight, lb
25	Armament weight, lb
26	Furnishings weight, lb
27	Air-conditioning and anti-icing weight, lb
28	Photographic weight, lb
29	Auxiliary gear weight, lb
30	Other item weight, lb
31	Crew weight, lb
32	Trapped fuel weight, lb
33	Oil weight, lb
34	Liquid-nitrogen weight, lb
35	Miscellaneous weight, lb
36	Guns weight, lb
37	Wing pylons weight, lb
38	Wing external tanks weight, lb
39	Fuselage pylons weight, lb

TABLE 15. DVWT WEIGHT DATA ARRAY VARIABLES IN OUTPUT MODULE (CONT)

Loc	Description
40	Fuselage external fuel tank weight, lb
41	Fuselage payload at BFDW, lb
42	Wing payload at BFDW, lb
43	Ammunition at BFDW, lb
44	Fuel, wing tank 1 at BFDW, lb
45	Fuel, wing tank 2 at BFDW, lb
46	Fuel, fuselage tank 1 at BFDW, lb
47	Fuel, fuselage tank 2 at BFDW, lb
48	Fuel, fuselage tank 3 at BFDW, lb
49	Fuel, fuselage tank 4 at BFDW, lb
50	Fuel, fuselage tank 5 at BFDW, lb
51	X-CG wing, in.
52	X-CG horizontal tail, in.
53	X-CG vertical tail, in.
54	X-CG fuselage, in.
55	X-CG main landing gear, in.
56	X-CG nose landing gear, in.
57	X-CG surface controls, in.
58	X-CG engine section and nacelles, in.
59	X-CG other structure, in.
60	X-CG engines, in.
61	X-CG auxiliary gearboxes and drives, in.
62	X-CG air induction system structure, in.
63	X-CG air induction system actuators and controls, in.
64	X-CG exhaust system, in.
65	X-CG cooling and drains, in.
66	X-CG lubrication system, in.
67	X-CG fuel system, in.
68	X-CG engine controls, in.
69	X-CG starting system, in.
70	X-CG auxiliary power unit, in.
71	X-CG instruments, in.
72	X-CG hydraulics, in.
73	X-CG electrical, in.
74	X-CG electronics, in.
75	X-CG armament, in.
76	X-CG furnishings, in.
77	X-CG air conditioning and anti-icing, in.
78	X-CG photographic, in.
79	X-CG auxiliary gear, in.

TABLE 15. DVWT WEIGHT DATA ARRAY VARIABLES
IN OUTPUT MODULE (CONCL)

Loc	Description
80	X-CG other items, in.
81	X-CG crew, in.
82	X-CG trapped fuel, in.
83	X-CG oil, in.
84	X-CG liquid nitrogen, in.
85	X-CG miscellaneous, in.
86	X-CG guns, in.
87	X-CG wing pylons, in.
88	X-CG wing external tanks, in.
89	X-CG fuselage pylons, in.
90	X-CG fuselage external tanks, in.
91	X-CG fuselage payload, in.
92	X-CG wing payload, in.
93	X-CG ammunition, in.
94	X-CG fuel, wing tank 1, in.
95	X-CG fuel, wing tank 2, in.
96	X-CG fuel, fuselage tank 1, in.
97	X-CG fuel, fuselage tank 2, in.
98	X-CG fuel, fuselage tank 3, in.
99	X-CG fuel, fuselage tank 4, in.
100	X-CG fuel, fuselage tank 5, in.
841	Fuselage payload at MDW, lb
842	Wing payload at MDW, lb
843	Ammunition at MDW, lb
844	Fuel, wing tank 1 at MDW, lb
845	Fuel, wing tank 2 at MDW, lb
846	Fuel, fuselage tank 1 at MDW,lb
847	Fuel , fuselage tank 2 at MDW, lb
848	Fuel, fuselage tank 3 at MDW, lb
849	Fuel, fuselage tank 4 at MDW, lb
850	Fuel, fuselage tank 5 at MDW, lb
851	Fuselage payload at LDW, lb
852	Wing payload at LDW, lb
853	Ammunition at LDW, lb
854	Fuel, wing tank 1 at LDW, lb
855	Fuel, wing tank 2 at LDW, lb
856	Fuel, fuselage tank 1 at LDW, lb
857	Fuel, fuselage tank 2 at LDW, lb
858	Fuel, fuselage tank 3 at LDW, lb
859	Fuel, fuselage tank 4 at LDW, lb
860	Fuel, fuselage tank 5 at LDW, lb

GDI(2)	Variable-sweep wing indicator 0 = fixed wing + = variable-sweep indicator
GDI(3)	Landing gear location indicator 0 = fuselage-mounted main gear + = wing-mounted main gear
GDV(1)	Vertical tail planform area, ft^2
GDV(3)	Vertical tail taper ratio
GDV(12)	Vertical tail thickness ratio at root
GDV(13)	Ratio of vertical tail thickness ratio at tip to thickness ratio at root
GDW(1)	Wing planform area (nominal position), ft^2
GDW(12)	Wing thickness ratio at root (nominal position)
GDW(13)	Ratio of wing thickness ratio at tip to thickness ratio at root (nominal position)
GDWT(154)	Number of crewmembers
GDWT(155)	Number of guns
SFN	Nacelle segment surface area, $in.^2$
TOT(1)	Total fuselage surface area, $in.^2$
TOT(2)	Total fuselage volume, $in.^3$
TOT(18)	Maximum cabin pressure differential, $lb/in.^2$
TOT(19)	Maximum fuselage depth, in.
TOT(20)	Maximum fuselage width, in.
XI	X-station of fuselage geometry cuts, in.

Arrays and Variables Calculated

IO	Weight summary pass counter 0 = initial estimated weight summary 1 = final estimated weight summary
S	Weight and geometry data (refer to Table 16)

Scratch Arrays and Variables

I	Scratch counter
J	Scratch counter

TABLE 16. S-ARRAY VARIABLES IN OUTPUT MODULE

Location	Description
1	Summation of weight empty items, lb
2	Summation of moments for weight empty items (wing in nominal position), in.-lb
3	Summation of fixed useful load items, lb
4	Summation of moments for fixed useful load items (wing in nominal position), in.-lb
5	Summation of expendable useful load items at BFDW, lb
6	Summation of moments for expendable useful load items at BFDW (wing in nominal position), in.-lb
7	Summation of expendable useful load items at MDW, lb
8	Summation of moments for expendable useful load items at MDW (wing in nominal position), in.-lb
9	Summation of expendable useful load items at LDW, lb
10	Summation of moments for expendable useful load items at LDW (wing in nominal position), in.-lb
11	Summation of useful load at MDW, lb
12	X-CG of useful load at MDW (wing in nominal position), in.
13	Summation of useful load at BFDW, lb
14	X-CG of useful load at BFDW (wing in nominal position), in.
15	Summation of useful load at LDW, lb
16	X-CG of useful load at LDW (wing in nominal position), in.
17	Maximum design weight (MDW), lb
18	X-CG at MDW (wing in. nominal position), in.
19	Basic flight design weight (BFDW), lb
20	X-CG at BFDW (wing in nominal position), in.
21	Landing design weight (LDW), lb
22	X-CG at LDW (wing in nominal position), in.
23	X-CG of weight empty items (wing in nominal position), in.
24	Weight of landing gear strucutre, lb
25	Structure group weight, lb
26	Propulsion group weight, lb
27	Air induction system structure, actuation, mechanism, and controls weight, lb
28	Not used
29	Not used
30	Not used
31	Maximum design weight (MDW) initial estimate, lb
32	Basic flight design weight (BFDW) initial estimate, lb
33	Landing design weight (LDW) initial estimate, lb
34	Not used
•	To
50	Not used

TABLE 16. S-ARRAY VARIABLES IN OUTPUT MODULE (CONCL)

Location	Description
51	Overall vehicle length, ft
52	Vehicle static height, ft
53	Fuselage length, ft
54	Maximum fuselage depth, ft
55	Maximum fuselage width, ft
56	Total fuselage surface area, ft^2
57	Total fuselage volume, ft^3
58	Nacelle length, ft
59	Maximum nacelle depth, ft
60	Maximum nacelle width, ft
61	Nacelle surface area, ft^2
62	Ratio of wing weight to wing planform area (nominal position), lb/ft^2
63	Wing span (nominal position), ft
64	Wing thickness at root, in.
65	Wing thickness at tip, in.
66	Ratio of horizontal tail weight to horizontal tail planform area, lb/ft^2
67	Horizontal tail thickness at root, in.
68	Horizontal tail tip chord, in
69	Horizontal tail thickness at tip, in.
70	Vertical tail area (total per vehicle), ft^2
71	Ratio of vertical tail weight to vertical tail planform area, lb/ft^2
72	Vertical tail tip chord, in.
73	Vertical tail thickness at tip, in.
74	Tail arm, quarter-chord wing mean aerodynamic chord to quarter-chord horizontal tail mean aerodynamic chord (wing in nominal position), ft
75	Maximum maneuver load factor at BFDW
76	Assumed wing loading at landing (100%)
77	Minimum speed, flaps down, at LDW, knots
78	Ultimate design cabin pressure differential, $lb/in.^2$
79	Vertical tail thickness at root, in.

Labeled Common Arrays

FDAT	Calculated weight from weight analysis modules (refer to Table 17)

Mass Storage File Records

Record 11	Input design data array for data management module
Record 19	Basic calculated data region from data management module

Error Messages

None

TABLE 17. FDAT ARRAY VARIABLES (FDATT BLOCK)

Loc	Defined		Description
	Routine	Overlay	
1	PRTD	(17,0)	Total wing structure weight, lb
2	PRTD	(17,0)	X-CG wing structure, in.
3	PRTD	(17,0)	Wing center section basic structure weight, lb
4	PRTD	(17,0)	Wing pivot weight (variable sweep wing), lb
5	PRTD	(17,0)	Wing outer panel basic structure weight, lb
6	PRTD	(17,0)	Wing ailerons weight, lb
7	PRTD	(17,0)	Wing trailing edge flaps weight, lb
8	PRTD	(17,0)	Wing leading edge flaps weight, lb
9	PRTD	(17,0)	Wing slats weight, lb
10	PRTD	(17,0)	Wing spoilers weight, lb
11	PRTD	(17,0)	Wing miscellaneous structure weight, lb
12	PRTD	(17,0)	Wingtip weight, lb
13			Not used
14			Not used
15	PRTD	(17,0)	Total horizontal tail structure weight, lb
16	PRTD	(17,0)	X-CG horizontal tail structure, in.
17	PRTD	(17,0)	Horizontal tail center section or spindle weight, lb
18	PRTD	(17,0)	Horizontal tail outer panel structure weight, lb
19	PRTD	(17,0)	Horizontal tail elevator weight, lb
20	PRTD	(17,0)	Horizontal tail miscellaneous structure weight, lb
21			Not used
22			Not used
23	PRTD	(17,0)	Total vertical tail structure weight, lb
24	PRTD	(17,0)	X-CG vertical tail structure, in.
25	PRTD	(17,0)	Vertical tail center section or spindle weight, lb
26	PRTD	(17,0)	Vertical tail outer panel structure weight, lb
27	PRTD	(17,0)	Vertical tail rudder weight, lb

TABLE 17. FDAT ARRAY VARIABLES (FDATT BLOCK) (CONT)

Loc	Defined		Description
	Routine	Overlay	
28	PRTD	(17,0)	Vertical tail miscellaneous structure weight, lb
29			Not used
30			Not used
31	FUS02	(12,0)	Fuselage basic structure weight, lb
32	FUS02	(12,0)	Fuselage secondary structure weight, lb
33			Not used
34	FUS02	(12,0)	Fuselage doors, panels, and miscellaneous structure weight, lb
35	FUS02	(12,0)	Total fuselage structure weight, lb
36	FUS02	(12,0)	X-CG fuselage structure, in
37			Not used
38			Not used
39			Not used
40			Not used
41	LGWT	(6,0)	Total main landing gear weight, lb
42	LGWT	(6,0)	Main landing gear wheels, brakes, tires, and tubes weight, lb
43	LGWT	(6,0)	Main landing gear structure weight, lb
44	LGWT	(6,0)	Main landing gear controls and miscellaneous weight,lb
45	LGWT	(6,0)	X-CG main landing gear, in.
46	LGWT	(6,0)	Total nose landing gear weight, lb
47	LGWT	(6,0)	Nose landing gear wheels, tires, and tubes weight, lb
48	LGWT	(6,0)	Nose landing gear structure weight, lb
49	LGWT	(6,0)	Nose landing gear controls and miscellaneous weight, lb
50	LGWT	(6,0)	X-CG nose landing gear, in.

TABLE 17. FDAT ARRAY VARIABLES (FDATT BLOCK) (CONCL)

Loc	Defined		Description
	Routine	Overlay	
51	AISMN	(7,0)	Air induction system structure weight, lb
52	AISMN	(7,0)	X-CG air induction system structure
53	AISMN	(7,0)	Inboard nacelle and engine section weight, lb
54	AISMN	(7,0)	Outboard nacelle and engine section weight, lb
55	AISMN	(7,0)	Engine section doors, panels, and miscellaneous structure weight, lb
56	AISMN	(7,0)	Total engine section and nacelles weight, lb
57	AISMN	(7,0)	X-CG engine section and nacelles, in.
58			Not used
59			Not used
60			Not used

FINAL OUTPUT MODULE FLOW CHART AND FORTRAN LIST

CARD ID PAGE/BOX NAME REFERENCES (SOURCE SEQUENCE NO. AND PAGE/BO

FORTRAN MODULE FINAL OUTPUT MODULE

CHART TITLE - INTRODUCTORY COMMENTS

CHART TITLE - PROCEDURES

(000037) 2.05 (000038) 2.06
(000038) 2.06 100
(000039) 2.07 110 (000025) 9.11
(000040) 2.08 (000042) 2.08
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(000043) 2.11 130 (000043) 2.10
(000047) 2.12 (000055) 2.16
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(000208) 5.06 262
(000211) 5.07 270 (000207) 5.05
(000212) 5.08 272
(000214) 5.09 280 (000211) 5.07
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(000338) 7.24 400 (000178) 4.13
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(000352) 7.31 406
(000357) 7.33 (000358) 8.01
(000358) 8.01 408
(000359) 8.03 410 (000351) 7.30
(000362) 8.13 420
(000401) 8.21 430 (000381) 8.12
(000404) 8.22 432 (000401) 8.21
(000413) 9.01 438 (000401) 8.21
(000421) 9.09 440 (000408) 8.28 (000412) 8.20

CHART TITLE - NON-PROCEDURAL STATEMENTS

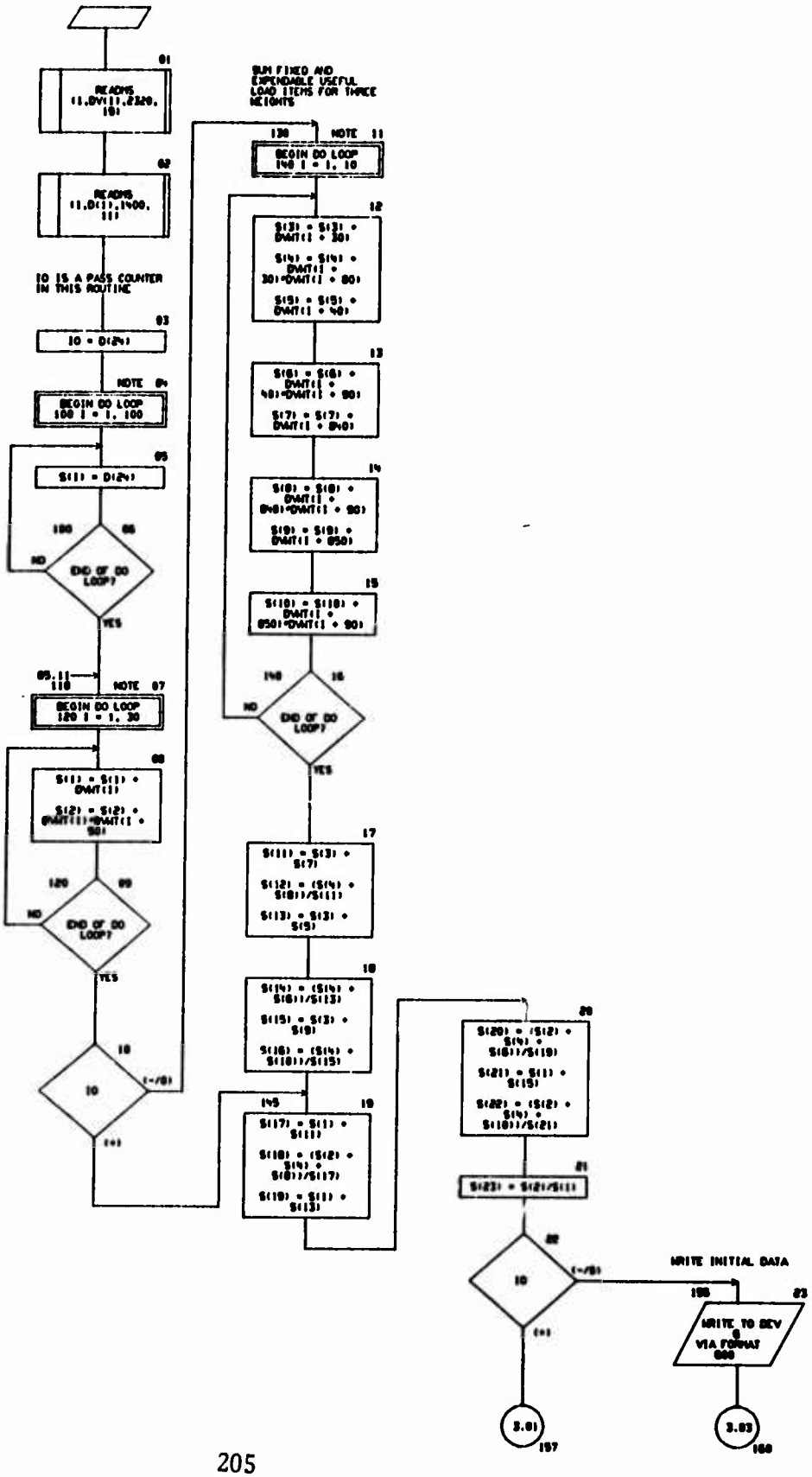
LOCATION		DIAGNOSTIC
CARD ID	PAGE/BOX	
(0000029)	2.01	UNDEFINED - 'READMS' EXTERNAL REFERENCE
(0000030)	2.02	UNDEFINED - 'READMS' EXTERNAL REFERENCE

CHART TITLE - INTRODUCTORY COMMENTS

PROGRAM OUTPUT

WRITTEN 9 SEPTEMBER 1972
TO DEVELOP OUTPUT DATA AND SUMMARY

CHART TITLE - PROCEDURES



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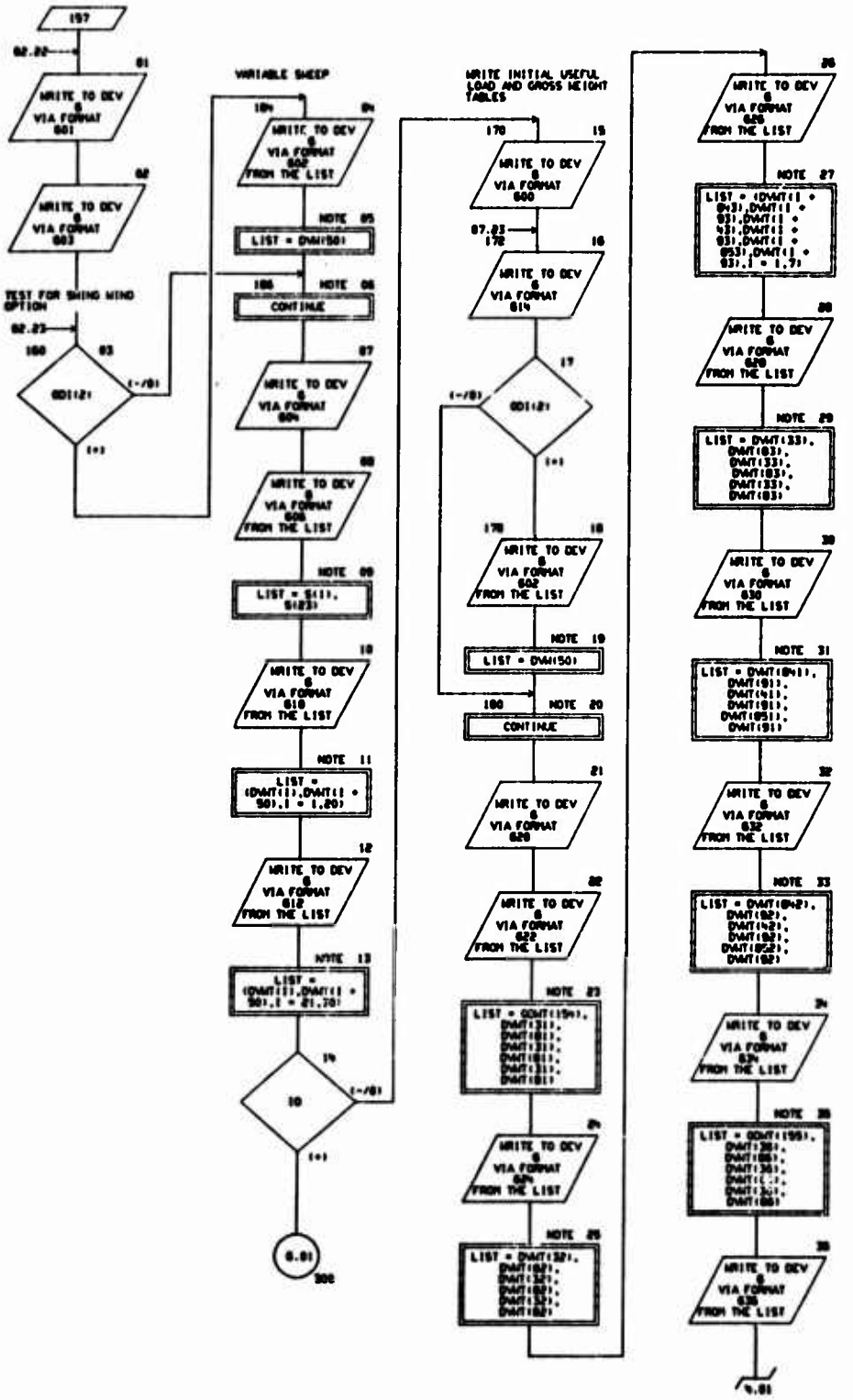

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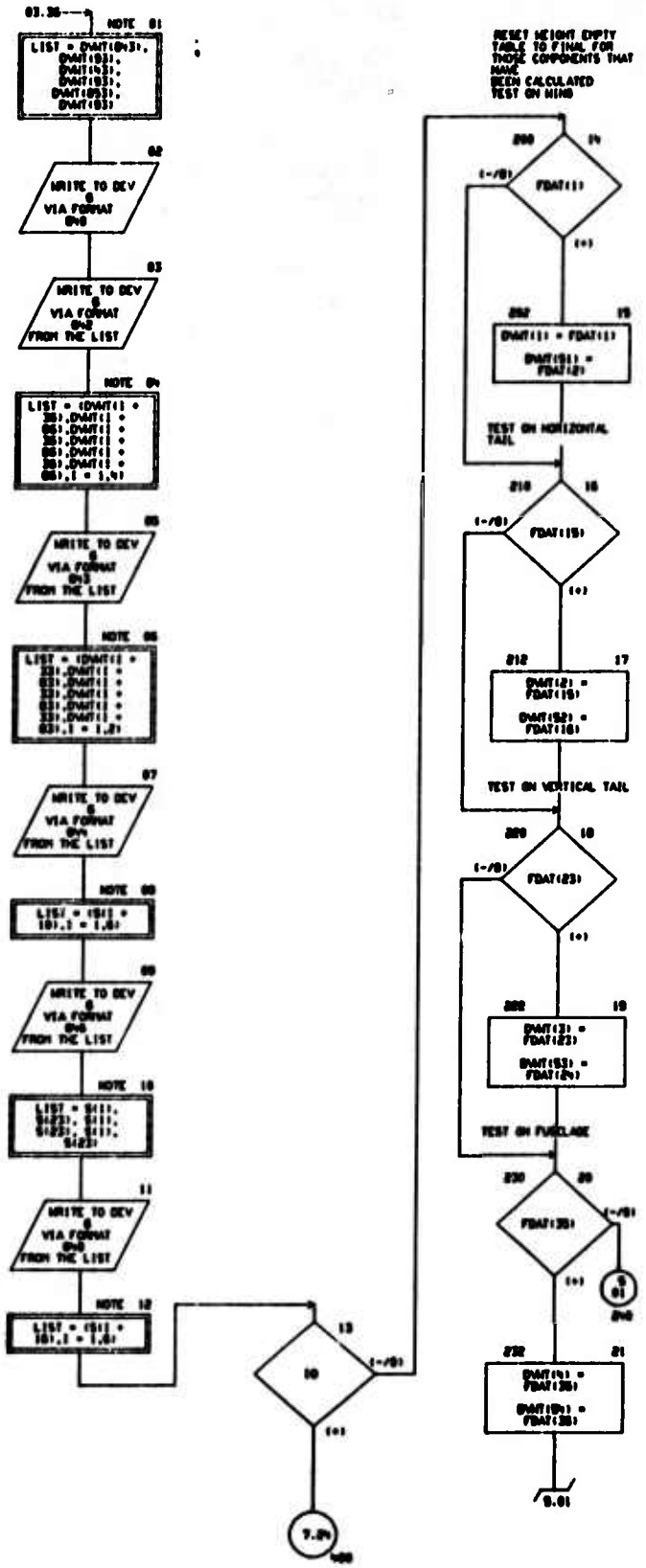

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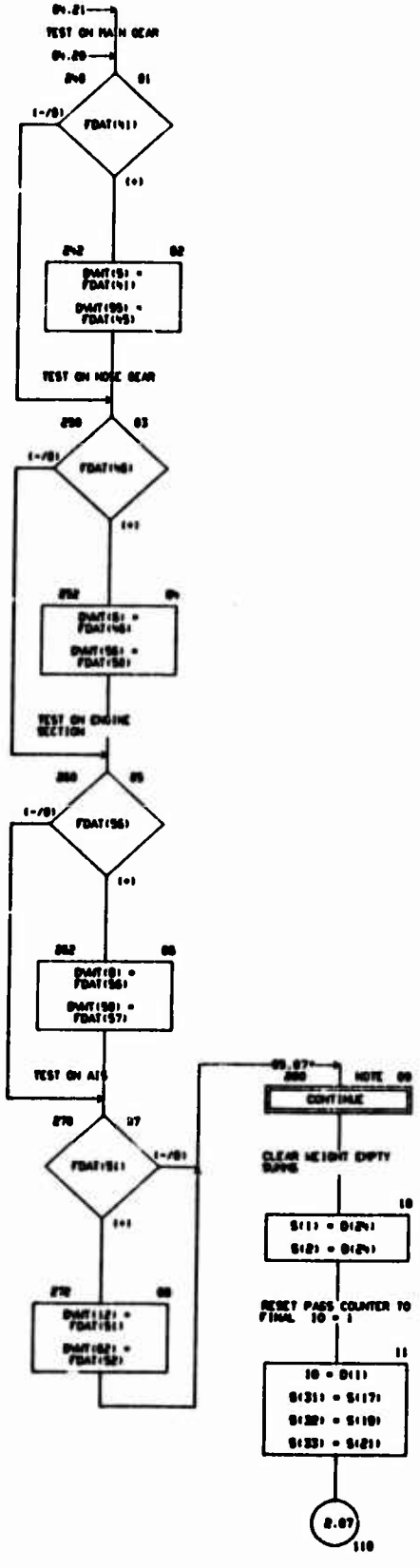

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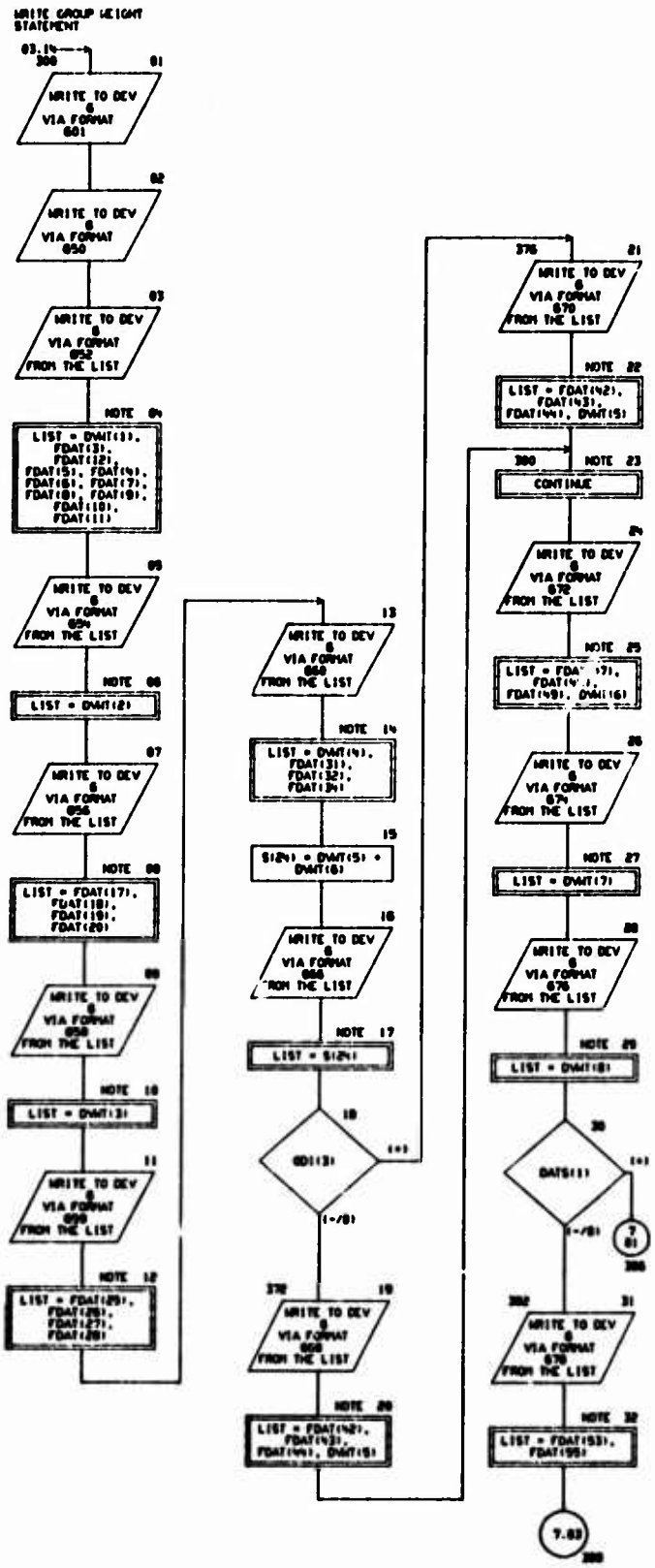

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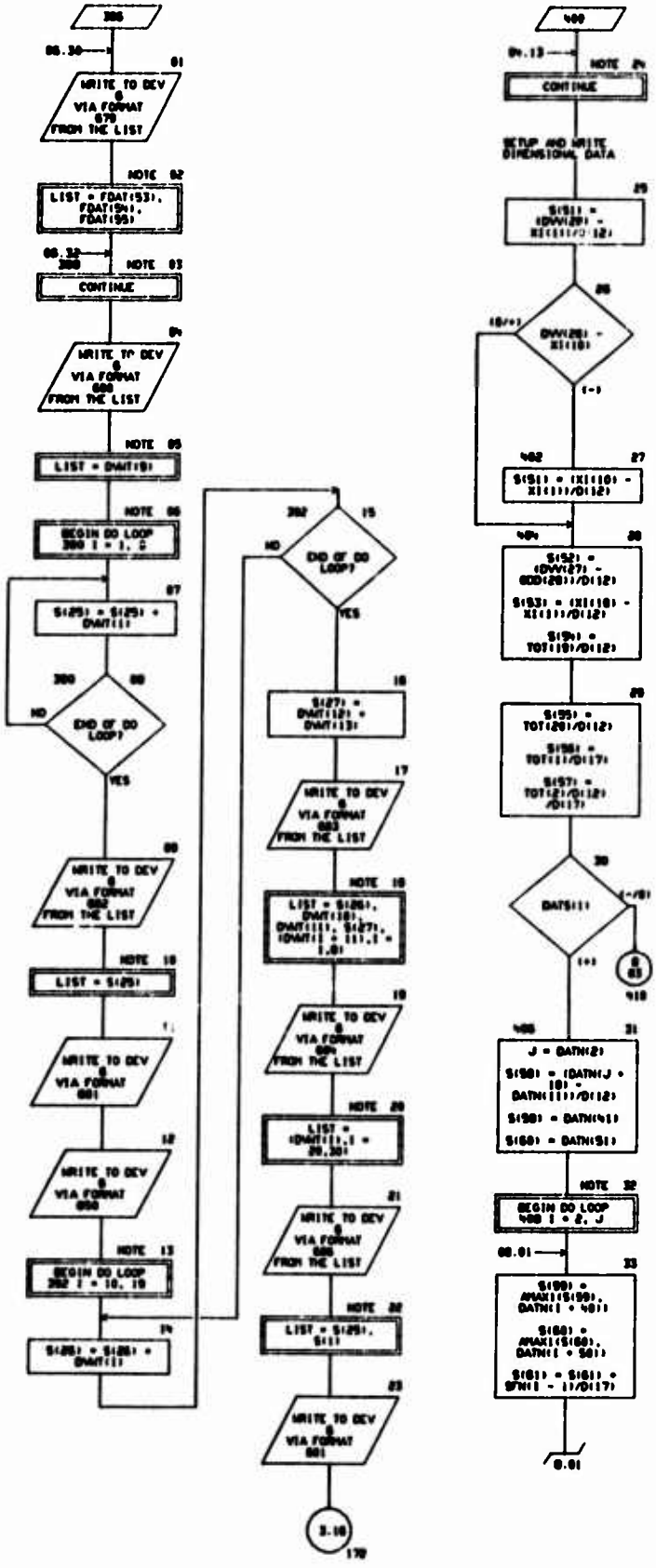

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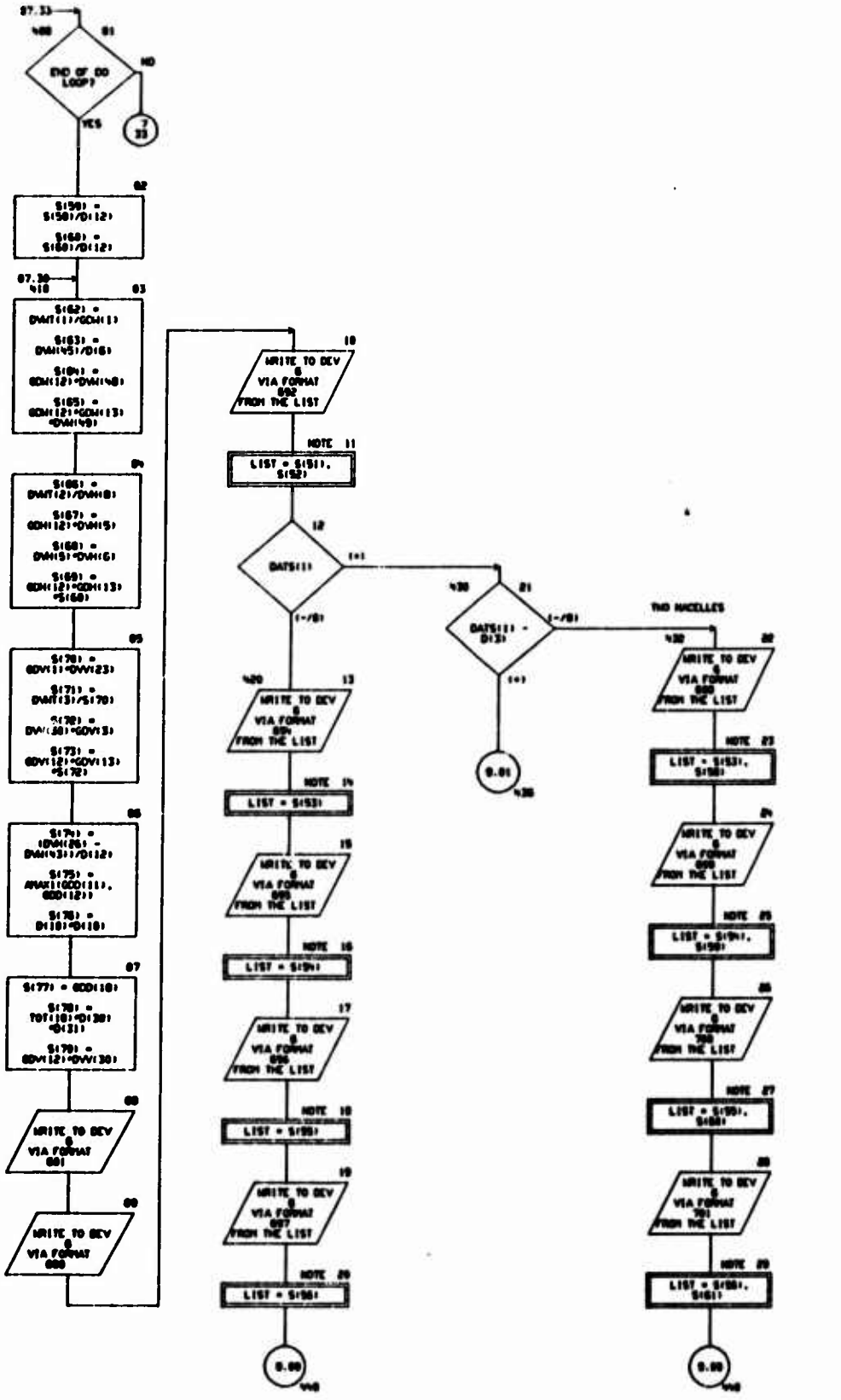

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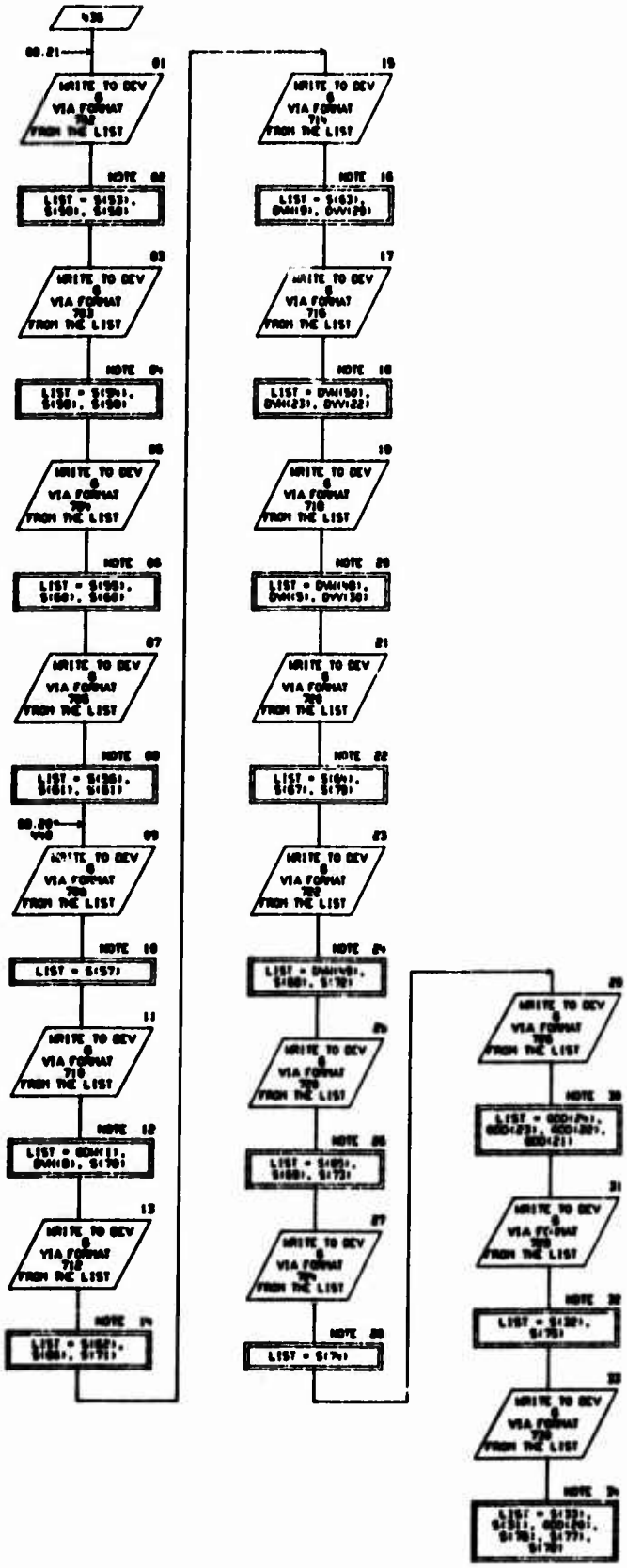

CHART TITLE - NON-PROCEDURAL STATEMENTS

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      COMMON /TDATT/TDAT(60)
      COMMON TCOM(4320)
      DIMENSION D(700),GD(700),DV(2320),S(400),ND(200)
      DIMENSION EQU(200)
      DIMENSION GD(20),GDD(30),GDMT(160),GDH(50),GDH(40),GDV(40),
     GDB(80),DATS(40),DATN(70),X(10)
      DIMENSION DVH(50),DVH(30),DVV(30),DVB(440),DVN(150),DVMT(1000)
      DIMENSION TOT(20), SFN(10)
      EQUIVALENCE (D(1),TCOM(1)),(GD(1),TCOM(70)),(DV(1),TCOM(140)),
     (S(1),TCOM(372)),(ND(1),TCOM(412))
      EQUIVALENCE (GD(1),GD(2)),(GDD(1),GD(2)),
     (GDMT(1),GD(9)),(GDH(1),GD(25)),
     (GDH(1),GD(30)),(GDV(1),GD(34)),(GDB(1),GD(38)),
     (DATS(1),GD(46)),(DATN(1),GD(50)),(X(1),GDB(6))
      EQUIVALENCE (EQU(1),D(8))
      EQUIVALENCE (DVH(1),DV(32)),(DVH(1),DV(37)),(DVV(1),DV(40)),
     (DVB(1),DV(43)),(DVN(1),DV(97)),(DVMT(1),DV(112))
      EQUIVALENCE (TOT(1),DVB(36)), (SFN(1),DVN(7))
  600 FORMAT(1HI,23X,61HI N I T I A L  W E I G H T  A N D  B A L A N
     C E  D A T A)
  601 FORMAT(1HI,32X,43HG R O U P  W E I G H T  S T A T E M E N T)
  603 FORMAT(/41X,25HWEIGHT EMPTY BALANCE DATA)
  602 FORMAT(/32X,33HVARIABLE SWEEP WING  SWEEP =,F7.2,5H DEG.)
  604 FORMAT(/60X,6HWEIGHT,5X,10HMOMENT. ARM)
  606 FORMAT(/26X,12HWEIGHT EMPTY,T56,3F12.2)
  610 FORMAT(/29X,4HWING,T56,3F12.2,   /29X,10HHORIZONTAL,T56,3F12.2,
     /29X,8HVERTICAL,T56,3F12.2,     /29X,4HBODY,T56,3F12.2,
     /29X,9HMAIN GEAR,T56,3F12.2,    /29X,9HNOSE GEAR,T56,3F12.2,
     /29X,16HSURFACE CONTROLS,T56,3F12.2,
     /29X,14HENGINE SECTION,T56,3F12.2,
     /29X,15HOTHER STRUCTURE,T56,3F12.2,
     //29X,6HENGINE,T56,3F12.2,
     /29X,20HACCESSORY GEAR BOXES,T56,3F12.2,
     /29X,20HAIR INDUCTION SYSTEM,T56,3F12.2,
     /29X,20HAIS ACTUATION AND CONTROLS,T56,3F12.2,
     /29X,14HEXHAUST SYSTEM,T56,3F12.2,
     /29X,18HCOOLING AND DRAINS,T56,3F12.2,
     /29X,18HLUBRICATING SYSTEM,T56,3F12.2,
     /29X,11HFUEL SYSTEM,T56,3F12.2,
     /29X,15HENGINE CONTROLS,T56,3F12.2,
     /29X,19HSTARTING SYSTEM,T56,3F12.2,
     /29X,20HAUXILIARY POWER UNIT,T56,3F12.2)
  612 FORMAT(/29X,11HINSTRUMENTS,T56,3F12.2,
     /29X,9HHYDRAULIC,T56,3F12.2,    /29X,10HELECTRICAL,T56,3F12.2,
     /29X,11HELECTRONICS,T56,3F12.2, /29X,8HARMAMENT,T56,3F12.2,
     /29X,11HFURNISHINGS,T56,3F12.2,
     /29X,16HAIR CONDITIONING,T56,3F12.2,
     /29X,12HPHOTOGRAPHIC,T56,3F12.2,
     /29X,14HAUXILIARY GEAR,T56,3F12.2,
     /29X,15HOTHER EQUIPMENT,T56,3F12.2)
  614 FORMAT(/40X,20HUSEFUL LOAD AND GROSS WEIGHT)
  620 FORMAT(/12X,14HLOAD CONDITION,21X,14HMAXIMUM DESIGN,8X,
     13HFLIGHT DESIGN,7X,14HLANDING DESIGN,/51X,8HWEIGHT,12X,
     12HGROSS WEIGHT,9X,12HGROSS WEIGHT,//49X,10HWEIGHT ARM,11X,
     10HWEIGHT ARM,11X,10HWEIGHT ARM)
  622 FORMAT(6X,9HCREW (NO.,F4.1,1H),T49,3(F10.1,F8.2,3X))
  624 FORMAT(/6X,4HFUEL,/8X,6HUSABLE,T49,3(F10.1,F8.2,3X))
  626 FORMAT(8X,8HINTERNAL,T49,3(F10.1,F8.2,3X),
     /T49,3(F10.1,F8.2,3X),/T49,3(F10.1,F8.2,3X),
     /T49,3(F10.1,F8.2,3X),/T49,3(F10.1,F8.2,3X),
     /T49,3(F10.1,F8.2,3X),/T49,3(F10.1,F8.2,3X))
  630 FORMAT(/6X,3HOIL,T49,3(F10.1,F8.2,3X))
```

CHART TITLE - NON-PROCEDURAL STATEMENTS

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      630   FORMAT(/6X,16HFUSELAGE PAYLOAD,T45,3(F10.1,F8.2,3X))
      632   FORMAT(6X,12HWING PAYLOAD,T45,3(F10.1,F8.2,3X))
      634   FORMAT(/6X,8HARMAMENT,/6X,18HGUNS (QTY.,F4.1,1H),T45,
             3(F10.1,F8.2,3X))
      636   FORMAT(6X,18HAMMUNITION,T45,3(F10.1,F8.2,3X))
      640   FORMAT(6X,23HINSTALLATIONS (PYLONS RACKS ETC.))
      642   FORMAT(10X,4HWING,T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X),
             /10X,8HFUSELAGE,T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X))
      643   FORMAT(/6X,9HEQUIPMENT,/6X,11HOXYGEN, LNE,T45,3(F10.1,F8.2,3X),
             /6X,13HMISCELLANEOUS,T45,3(F10.1,F8.2,3X))
      644   FORMAT(/6X,11HUSEFUL LOAD,T45,3(F10.1,F8.2,3X))
      646   FORMAT(6X,12HWEIGHT EMPTY,T45,3(F10.1,F8.2,3X))
      648   FORMAT(/6X,13HGROSS WEIGHT,T45,3(F10.1,F8.2,3X))
      650   FORMAT(/47X,12HWEIGHT EMPTY)
      652   FORMAT(/6X,10HWING GROUP,T93,F12.1,/10X,
             23HCENTER SECTION - BASIC STRUCTURE,T81,F12.1,/10X,
             4HOUTER PANEL - BASIC STRUCTURE(INCL. TIPS,F6.1,6H LBS.),T81,F12.
             1,/10X,3HPIVOT,T81,F12.1,/10X,
             8HAILERONS,T81,F12.1,/10X,21HFLAPS - TRAILING EDGE,T81,F12.1,/10X,
             20HFLAPS - LEADING EDGE,T81,F12.1,/10X,5HSLATS,T81,F12.1,/10X,
             8HSPOILERS,T81,F12.1,/10X,13HMISCELLANEOUS,T81,F12.1)
      654   FORMAT(/6X,21HHORIZONTAL TAIL GROUP,T93,F12.1)
      656   FORMAT(10X,23HCENTER SECTION/SPINDLE,T81,F12.1,/10X,
             20HSTABILIZER - BASIC STRUCTURE,T81,F12.1,/10X,
             9HELEVATOR,T81,F12.1,/10X,
             13HMISCELLANEOUS,T81,F12.1)
      658   FORMAT(/6X,19HVERTICAL TAIL GROUP,T93,F12.1)
      660   FORMAT (10X,23HCENTER SECTION/SPINDLE,T81,F12.1,/10X,
             20FINS - BASIC STRUCTURE,T81,F12.1,/10X,
             8HRUDDER,T81,F12.1,/10X,
             13HMISCELLANEOUS,T81,F12.1)
      662   FORMAT(/6X,10HBODY GROUP,T93,F12.1,/10X,
              24HFUSELAGE BASIC STRUCTURE,T81,F12.1,/10X,
              23HSECONDARY STRUCTURE - FUSELAGE,T81,F12.1,/30X,
              22H- DOORS, PANELS, AND MISC.,T81,F12.1)
      665   FORMAT(/6X,20HALIGHTING GEAR GROUP,T93,F12.1,/6X,14HWHEELS, BRAKE
             S,/10X,8HLOCATION,23X,13HTIRES, TUBES,2X,9HSTRUCTURE,3X,
              9HCONTROLS)
      666   FORMAT(10X,20HFUSELAGE - MAIN GEAR,T45,4F12.1)
      670   FORMAT(10X,10HWING - MAIN GEAR,T45,4F12.1)
      672   FORMAT(10X,20HFUSELAGE - NOSE GEAR,T45,4F12.1)
      674   FORMAT(/6X,23HSURFACE CONTROLS GROUP,T93,F12.1)
      675   FORMAT(/6X,14HENGINE SECTION,T93,F12.1)
      676   FORMAT(10X,7HINBOARD,/10X,9HCENTER,T81,F12.1,/10X,9HOUTBOARD,
             /10X,24HDOORS, PANELS, AND MISC.,T81,F12.1)
      678   FORMAT(10X,7HINBOARD,T81,F12.1,/10X,9HCENTER,/10X,9HOUTBOARD,
             T81,F12.1,/10X,24HDOORS, PANELS, AND MISC.,T81,F12.1)
      680   FORMAT(/6X,27HSTRUCTURE - OTHER AND MISC.,T93,F12.1)
      682   FORMAT(/6X,25HTOTAL (TO BE BROUGHT FORWARD),T93,F12.1)
      683   FORMAT(//6X,19HPROPULSION GROUP, T93,F12.1,/10X,
             19HENGINE INSTALLATION,T81,F12.1,/10X,
             30HACCESSORY GEAR BOXES AND DRIVES,T81,F12.1,/10X,
             28HAIR INDUCTION SYSTEM,T81,F12.1,/12X,9HSTRUCTURE,T69,F12.1,
             /12X,28HACTUATION AND CONTROLS,T69,F12.1,/10X,
             14HEXHAUST SYSTEM,T81,F12.1,/10X,
             28HCOOLING SYSTEM AND DRAIN PROVISIONS,T81,F12.1,/10X,
             18HLUBRICATING SYSTEM,T81,F12.1,/10X,11HFUEL SYSTEM,T81,F12.1,
             /10X,19HENGINE CONTROLS,T81,F12.1,/10X,19HSTARTING SYSTEM,
             T81,F12.1)
      684   FORMAT(/6X,27HAUXILIARY POWER PLANT GROUP,T93,F12.1,//6X,
             17HINSTRUMENTS GROUP,T93,F12.1,//6X,
             31HHYDRAULICS AND PNEUMATICS GROUP,T93,F12.1,//6X,
             18HELECTRICAL GROUP,T93,F12.1,//6X,17HELECTRONICS GROUP,T93,
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CHART TITLE - NON-PROCEDURAL STATEMENTS

```
     F12.1,//6X,14HARMAMENT GROUP,T93,F12.1,//6X,
     31HFURNISHINGS AND EQUIPMENT GROUP,T93,F12.1,//6X,
     47HAIR CONDITIONING AND ANTI-ICING EQUIPMENT GROUP,T93,F12.1,
     //6X,18HPHOTOGRAPHIC GROUP,T93,F12.1,//6X,
     28HAUXILIARY GEAR GROUP,T93,F12.1,//6X,
     25HOTHER EQUIPMENT AND MISC.,T93,F12.1)
666  FORMAT(/6X,24HTOTAL FROM PREVIOUS PAGE,T93,F12.1//6X,
     18HWEIGHT EMPTY,T93,F12.1)
699  FORMAT(/35X,31HDIMENSIONAL AND STRUCTURAL DATA)
702  FORMAT(//6X,22HLENGTH - OVERALL (FT.),F7.2,20X,
     31HHEIGHT - OVERALL - STATIC (FT.),F7.2//85X,8HNACELLES,/61X,
     8HFUSELAGE,5X,7HINBOARD,5X,8HCENTER,5X,8HOUTBOARD)
704  FORMAT(6X,19HLENGTH - MAX. (FT.),T57,F12.2)
705  FORMAT(6X,19HDEPTH  - MAX. (FT.),T57,F12.2)
706  FORMAT(6X,19HWIDTH  - MAX. (FT.),T57,F12.2)
707  FORMAT(6X,21HWETTED AREA (SQ. FT.),T57,F12.2)
708  FORMAT(6X,19HLENGTH - MAX. (FT.),T57,2F12.2)
709  FORMAT(6X,19HDEPTH  - MAX. (FT.),T57,2F12.2)
710  FORMAT(6X,19HWIDTH  - MAX. (FT.),T57,2F12.2)
711  FORMAT(6X,21HWETTED AREA (SQ. FT.),T57,2F12.2)
712  FORMAT(6X,19HLENGTH - MAX. (FT.),T57,2F12.2,12X,F12.2)
713  FORMAT(6X,19HDEPTH  - MAX. (FT.),T57,2F12.2,12X,F12.2)
714  FORMAT(6X,19HWIDTH  - MAX. (FT.),T57,2F12.2,12X,F12.2)
715  FORMAT(6X,21HWETTED AREA (SQ. FT.),T57,2F12.2,12X,F12.2)
716  FORMAT(6X,25HFUSELAGE VOLUME (CU. FT.),T57,F12.2)
718  FORMAT(/75X,4HWING,7X,7HH. TAIL,4X,7HV. TAIL,/6X,
     20HGROSS AREA (SQ. FT.),T69,3F12.2)
719  FORMAT(6X,33HWEIGHT/GROSS AREA (LBS./SQ. FT.),T69,3F12.2)
720  FORMAT(6X,10HSPAN (FT.),T69,3F12.2)
721  FORMAT(6X,29HSWEEPBACK - AT .25C (DEGREES),T69,3F12.2)
722  FORMAT(6X,49HTHEORETICAL ROOT CHORD - LENGTH (INCHES),T69,3F12.2)
723  FORMAT(29X,25H- MAX. THICKNESS (INCHES),T69,3F12.2)
724  FORMAT(6X,49HTHEORETICAL TIP CHORD  - LENGTH (INCHES),T69,3F12.2)
725  FORMAT(6X,31HTAIL LENGTH - .25 MAC WING TO .25 MAC H. TAIL (FT.),
     T81,F12.2)
726  FORMAT(/6X,14HALIGHTING GEAR,55X,4HNOSE,8X,4HMAIN,/8X,
     9HLENGTH - OLEO EXTENDED - AXLE TO TRUNNION (INCHES),T69,2F12.2,
     /8X,9HWHEEL TRAVEL - FULL EXTENDED TO FULL COLLAPSED (INCHES),
     T69,2F12.2)
727  FORMAT(/6X,27HSTRUCTURAL DATA - CONDITION,52X,8HSTRESS,4X,
     18HLIMIT LOAD,/62X,12HGROSS WEIGHT,4X,8HFACTOR,/8X,
     6HFLIGHT,T81,2F12.2)
730  FORMAT(8X,7HLANDING,T81,F12.2,/8X,
     8HTAKE-OFF,T81,F12.2,/8X,33HLIMIT AIRPLANE LANDING SINK SPEED,
     11H (FT./SEC.),T93,F12.2,/8X,
     30HWING LIFT ASSUMED FOR LANDING DESIGN CONDITION (PERCENT WT.),
     T93,F12.2,/8X,37HSTALL SPEED - LANDING CONFIGURATION -,
     18H POWER OFF (KNOTS),T93,F12.2,/8X,19HPRESSURIZED CABIN -,
     9H ULT. DESIGN PRESSURE DIFFERENTIAL - FLIGHT (P.S.I),
     T93,F12.2)
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FORTRAN MODULE (LIST,AUTOSEQ)

CARD NO **** CONTENTS ****

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C
C ((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((((
C                                    PROGRAM OUTPUT
C ))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))))
C
      PROGRAM OUTPUT
C
C       WRITTEN 9 SEPTEMBER 1972
C       TO DEVELOP OUTPUT DATA AND SUMMARY
      COMMON /FDATT/FDAT(60)
      COMMON TCOM(4320)
      DIMENSION D(700),GD(700),DV(2320),S(400),ND(200)
      DIMENSION EQU(200)
      DIMENSION GDI(20),GDD(30),GDWT(160),GDN(50),GDH(40),GDV(40),
     1 GDB(80),DATS(40),DATH(70),XI(10)
      DIMENSION DVW(50),DVH(30),DVV(30),DVB(440),DVN(150),DVWT(1000)
      DIMENSION TOT(20), SFN(10)
      EQUIVALENCE (D(1),TCOM(1)),(GD(1),TCOM(701)),(DV(1),TCOM(1401)),
     1 (S(1),TCOM(3721)),(ND(1),TCOM(4121))
      EQUIVALENCE (GDI(1),GD(1)),(GDD(1),GD(21)),
     1 (GDWT(1),GD(91)),(GDN(1),GD(251)),
     2 (GDH(1),GD(301)),(GDV(1),GD(341)),(GDB(1),GD(381)),
     3 (DATS(1),GD(461)),(DATH(1),GD(591)),(XI(1),GD(61))
      EQUIVALENCE (EQU(1),D(81))
      EQUIVALENCE (DVW(1),DV(321)),(DVH(1),DV(371)),(DVV(1),DV(401)),
     1 (DVB(1),DV(431)),(DVN(1),DV(971)),(DVWT(1),DV(1121))
      EQUIVALENCE (TOT(1),DVB(381)), (SFN(1),DVN(71))
C
      CALL READMS(1,DV(1),2320,10)
      CALL READMS(1,D(1),1400,11)
C
C
C
C       IO IS A PASS COUNTER IN THIS ROUTINE
      IO = D(24)
      DO 100 I=1,100
      S(I) = D(24)
  100 CONTINUE
  110 DO 120 I=1,30
      S(1) = S(1) + DVWT(I)
      S(2) = S(2) + DVWT(I)*DVWT(I+50)
  120 CONTINUE
      IF(IO) 130,130,145
C
C       SUM FIXED AND EXPENDABLE USEFUL LOAD ITEMS FOR THREE WEIGHTS
  130 DO 140 I=1,10
      S(3) = S(3) + DVWT(I+30)
      S(4) = S(4) + DVWT(I+30)*DVWT(I+80)
      S(5) = S(5) + DVWT(I+40)
      S(6) = S(6) + DVWT(I+40)*DVWT(I+90)
      S(7) = S(7) + DVWT(I+840)
      S(8) = S(8) + DVWT(I+840)*DVWT(I+90)
      S(9) = S(9) + DVWT(I+850)
      S(10) = S(10) + DVWT(I+850)*DVWT(I+90)
  140 CONTINUE
      S(11) = S(3) + S(7)
      S(12) = (S(4) + S(8))/S(11)
      S(13) = S(3) + S(5)
      S(14) = (S(4) + S(6))/S(13)
      S(15) = S(3) + S(9)
      S(16) = (S(4) + S(10))/S(15)
  145 S(17) = S(1) + S(11)
      S(18) = (S(2) + S(4) + S(8))/S(17)
      S(19) = S(1) + S(13)
      S(20) = (S(2) + S(4) + S(6))/S(19)
      S(21) = S(1) + S(15)
      S(22) = (S(2) + S(4) + S(10))/S(21)
      S(23) = S(2)/S(1)
C
      IF(IO) 155,155,157
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CARD NO **** CONTENTS ****

```
C       WRITE INITIAL DATA
  195 WRITE(6,600)
  600 FORMAT(1H1,23X,61HI N I T I A L   W E I G H T   A N D   B A L A N
     1C E   D A T A)
      GO TO 160
C      .
  197 WRITE(6,601)
  601 FORMAT(1H1,32X,43HG R O U P   W E I G H T   S T A T E M E N T)
      WRITE(6,603)
  603 FORMAT(/41X,25HWEIGHT EMPTY BALANCE DATA)
C
C        TEST FOR SWING WING OPTION
  160 IF(ODI(2)) 166,166,164
C        VARIABLE SWEEP
  164 WRITE(6,602) DVW(50)
  602 FORMAT(/32X,33HVARIABLE SWEEP WING  SWEEP .25C =,F7.2,5H DEG.)
  166 CONTINUE
      WRITE(6,604)
  604 FORMAT(/60X,6HWEIGHT,5X,10HHORIZ. ARM)
      WRITE(6,606) S(1),S(23)
  606 FORMAT(/26X,12HWEIGHT EMPTY,T56,2F12.2)
      WRITE(6,610) (DWT(I),DWT(I+50),I=1,20)
  610 FORMAT(/29X,4HWING,T56,2F12.2,   /29X,10HHORIZONTAL,T56,2F12.2,
     1 /29X,8HVERTICAL,T56,2F12.2,     /29X,4HBODY,T56,2F12.2,
     2 /29X,9HMAIN GEAR,T56,2F12.2,    /29X,9HNOSE GEAR,T56,2F12.2,
     3 /29X,16HSURFACE CONTROLS,T56,2F12.2,
     4 /29X,14HENGINE SECTION,T56,2F12.2,
     5 /29X,15HOTHER STRUCTURE,T56,2F12.2,
     6 //29X,6HENGINE,T56,2F12.2,
     7 /29X,20HACCESSORY GEAR BOXES,T56,2F12.2,
     8 /29X,20HAIR INDUCTION SYSTEM,T56,2F12.2,
     9 /29X,26HAIS ACTUATION AND CONTROLS,T56,2F12.2,
     A /29X,14HEXHAUST SYSTEM,T56,2F12.2,
     B /29X,18HCOOLING AND DRAINS,T56,2F12.2,
     C /29X,18HLUBRICATING SYSTEM,T56,2F12.2,
     D /29X,11HFUEL S STEM,T56,2F12.2,
     E /29X,15HENGINE CONTROLS,T56,2F12.2,
     F /29X,15HSTARTING SYSTEM,T56,2F12.2,
     G /29X,20HAUXILIARY POWER UNIT,T56,2F12.2)
      WRITE(6,612)(DWT(I),DWT(I+50),I=21,30)
  612 FORMAT(/29X,11HINSTRUMENTS,T56,2F12.2,
     1 /29X,9HHYDRAULIC,T56,2F12.2,    /29X,10HELECTRICAL,T56,2F12.2,
     2 /29X,11HELECTRONICS,T56,2F12.2, /29X,8HARMAMENT,T56,2F12.2,
     3 /29X,11HFURNISHINGS,T56,2F12.2,
     4 /29X,16HAIR CONDITIONING,T56,2F12.2,
     5 /29X,12HPHOTOGRAPHIC,T56,2F12.2,
     6 /29X,14HAUXILIARY GEAR,T56,2F12.2,
     7 /29X,15HOTHER EQUIPMENT,T56,2F12.2)
C
      IF(IO) 170,170,300
C       WRITE INITIAL USEFUL LOAD AND GROSS WEIGHT TABLES
  170 WRITE(6,600)
  172 WRITE(6,614)
  614 FORMAT(/40X,28HUSEFUL LOAD AND GROSS WEIGHT)
      IF(ODI(2)) 180,180,178
  178 WRITE(6,602) DVW(50)
  180 CONTINUE
      WRITE(6,620)
  620 FORMAT(/12X,14HLOAD CONDITION,21X,14HMAXIMUM DESIGN,8X,
     1 13HFLIGHT DESIGN,7X,14HLANDING DESIGN,/51X,6HWEIGHT,12X,
     2 12HGROSS WEIGHT,9X,12HGROSS WEIGHT,//48X,10HWEIGHT ARM,11X,
     3 10HWEIGHT ARM,11X,10HWEIGHT ARM)
      WRITE(6,622) GDWT(154),DWT(31),DWT(81),DWT(31),DWT(81),
     1 DWT(31),DWT(81)
  622 FORMAT(6X,9HCREW (NO.,F4.1,1H),T45,3(F10.1,F8.2,3X))
      WRITE(6,624) DWT(32),DWT(82),DWT(32),DWT(82),DWT(32),DWT(82)
  624 FORMAT(/6X,4HFUEL,/8X,8HUNUSABLE,T45,3(F10.1,F8.2,3X))
      WRITE(6,626)(DWT(I+843),DWT(I+93),DWT(I+43),DWT(I+93),
     1 DWT(I+853),DWT(I+93),I=1,7)
  626 FORMAT(8X,8HINTERNAL,T45,3(F10.1,F8.2,3X),
     1 /T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X),
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CARD NO **** CONTENTS ****

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      2 /T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X),
      3 /T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X))
       WRITE(6,628) DWIT(33),DWIT(83),DWIT(33),DWIT(83),DWIT(33),DWIT(83)
  628 FORMAT(/6X,3HOIL,T45,3(F10.1,F8.2,3X))
       WRITE(6,630) DWIT(841),DWIT(91),DWIT(41),DWIT(91),DWIT(851),
      1 DWIT(91)
  630 FORMAT(/6X,16HFUSELAGE PAYLOAD,T45,3(F10.1,F8.2,3X))
       WRITE(6,632) DWIT(842),DWIT(92),DWIT(42),DWIT(92),DWIT(852),
      1 DWIT(92)
  632 FORMAT(6X,12HWING PAYLOAD,T45,3(F10.1,F8.2,3X))
       WRITE(6,634) GONT(199),DWIT(36),DWIT(86),DWIT(36),DWIT(86),
      1 DWIT(36),DWIT(86)
  634 FORMAT(/6X,8HARMAMENT,/8X,10HGUNS (QTY.,F4.1,1H),T45,
      1 3(F10.1,F8.2,3X))
       WRITE(6,636) DWIT(843),DWIT(93),DWIT(43),DWIT(93),DWIT(853),
      1 DWIT(93)
  636 FORMAT(8X,10HAMMUNITION,T45,3(F10.1,F8.2,3X))
       WRITE(6,640)
  640 FORMAT(8X,33HINSTALLATIONS (PYLONS RACKS ETC.))
       WRITE(6,642) (DWIT(I+36),DWIT(I+86),DWIT(I+36),DWIT(I+86),
      1 DWIT(I+36),DWIT(I+86),I=1,4)
  642 FORMAT(10X,4HWING,T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X),
      1 /10X,8HFUSELAGE,T45,3(F10.1,F8.2,3X),/T45,3(F10.1,F8.2,3X))
       WRITE(6,643) (DWIT(I+33),DWIT(I+83),DWIT(I+33),DWIT(I+83),
      1 DWIT(I+33),DWIT(I+83),I=1,2)
  643 FORMAT(/6X,9HEQUIPMENT,/8X,11HOXYGEN, LN2,T45,3(F10.1,F8.2,3X),
      1 /8X,13HMISCELLANEOUS,T45,3(F10.1,F8.2,3X))
       WRITE(6,644) (S(I+10),I=1,6)
  644 FORMAT(/6X,11HUSEFUL LOAD,T45,3(F10.1,F8.2,3X))
       WRITE(6,646) S(1),S(23),S(1),S(23),S(1),S(23)
  646 FORMAT(6X,12HWEIGHT EMPTY,T45,3(F10.1,F8.2,3X))
       WRITE(6,648) (S(I+16),I=1,6)
  648 FORMAT(/6X,12HGROSS WEIGHT,T45,3(F10.1,F8.2,3X))
C
       IF(IO) 200,200,400
C        RESET WEIGHT EMPTY TABLE TO FINAL FOR THOSE COMPONENTS THAT HAVE
C        BEEN CALCULATED
C        TEST ON WING
  200 IF(FDAT(1)) 210,210,202
  202 DWIT(1) = FDAT(1)
       DWIT(51) = FDAT(2)
C
C
C          TEST ON HORIZONTAL TAIL
 210  IF (FDAT(15)) 220,220,212
 212  DWIT(2) = FDAT(15)
       DWIT(52) = FDAT(16)
C
C        TEST ON VERTICAL TAIL
 220  IF (FDAT(23)) 230,230,222
 222  DWIT(3) = FDAT(23)
       DWIT(53) = FDAT(24)
C          TEST ON FUSELAGE
  230 IF(FDAT(35)) 240,240,232
  232 DWIT(4) = FDAT(35)
       DWIT(54) = FDAT(36)
C        TEST ON MAIN GEAR
  240 IF(FDAT(41)) 250,250,242
  242 DWIT(5) = FDAT(41)
       DWIT(35) = FDAT(45)
C          TEST ON NOSE GEAR
  250 IF(FDAT(46)) 260,260,252
  252 DWIT(6) = FDAT(46)
       DWIT(56) = FDAT(50)
C        TEST ON ENGINE SECTION
  260 IF(FDAT(56)) 270,270,262
  262 DWIT(8) = FDAT(56)
       DWIT(58) = FDAT(57)
C        TEST ON AIS
  270 IF(FDAT(51)) 280,280,272
  272 DWIT(12) = FDAT(51)
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CARD NO **** CONTENTS ****

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      DWT(62) = FDAT(52)
  800 CONTINUE
C
C         CLEAR WEIGHT EMPTY SUMS
C
      S(1) = D(24)
      S(2) = D(24)
C         RESET PASS COUNTER TO FINAL  IO = 1
      IO = B(1)
      S(31) = S(17)
      S(32) = S(19)
      S(33) = S(21)
      GO TO 110
C
C         WRITE GROUP WEIGHT STATEMENT
  300 WRITE(6,601)
      WRITE(6,850)
  850 FORMAT(/47X,12HWEIGHT EMPTY)
C
      WRITE (6,852) DWT(1),FDAT(3),FDAT(12),FDAT(5),FDAT(4),FDAT(6),FDA
     1T(7),FDAT(8),FDAT(9),FDAT(10),FDAT(11)
C
  852 FORMAT(/5X,10HWING GROUP,T93,F12.1,/10X,
     1 30HCENTER SECTION - BASIC STRUCTURE,T81,F12.1,/10X,
     240HOUTER PANEL - BASIC STRUCTURE(INCL. TIPS,F6.1,6H LBS.),T81,F12.
     31,/10X,5HPIVOT,T81,F12.1,/10X,
     49HAILERONS,T81,F12.1,/10X,21HFLAPS - TRAILING EDGE,T81,F12.1,/10X,
     520HFLAPS - LEADING EDGE,T81,F12.1,/10X,5HSLATS,T81,F12.1,/10X,
     68HSPOILERS,T81,F12.1,/10X,13HMISCELLANEOUS,T81,F12.1)
C
      WRITE(6,854) DWT(2)
  854 FORMAT(/5X,21HHORIZONTAL TAIL GROUP,T93,F12.1)
      WRITE (6,856) FDAT(17),FDAT(18),FDAT(19),FDAT(20)
  856 FORMAT(10X,22HCENTER SECTION/SPINDLE,T81,F12.1,/10X,
     128HSTABILIZER - BASIC STRUCTURE,T81,F12.1,/10X,
     28HELEVATOR,T81,F12.1,/10X,
     313HMISCELLANEOUS,T81,F12.1)
C
      WRITE(6,858) DWT(3)
  858 FORMAT(/5X,19HVERTICAL TAIL GROUP,T93,F12.1)
      WRITE (6,859) FDAT(25),FDAT(26),FDAT(27),FDAT(28)
  859 FORMAT (10X,22HCENTER SECTION/SPINDLE,T81,F12.1,/10X,
     122HFINS - BASIC STRUCTURE,T81,F12.1,/10X,
     26HRUDDER,T81,F12.1,/10X,
     313HMISCELLANEOUS,T81,F12.1)
C
      WRITE(6,860) DWT(4),FDAT(31),FDAT(32),FDAT(34)
  860 FORMAT(/5X,10HBODY GROUP,T93,F12.1,/10X,
     1 24HFUSELAGE BASIC STRUCTURE,T81,F12.1,/10X,
     2 30HSECONDARY STRUCTURE - FUSELAGE,T81,F12.1,/30X,
     3 20H- DOORS, PANELS, AND MISC.,T81,F12.1)
      S(24) = DWT(5) + DWT(6)
      WRITE(6,866) S(24)
  866 FORMAT(/5X,20HALIGHTING GEAR GROUP,T93,F12.1,/46X,14HWHEELS, BRAKE
     1S,/10X,8HLOCATION,23X,12HTIRES, TUBES,2X,9HSTRUCTURE,3X,
     2 8HCONTROLS)
C
      IF(ED1(3)) 372,372,376
  372 WRITE(6,868) FDAT(42),FDAT(43),FDAT(44),DWT(5)
  868 FORMAT(10X,20HFUSELAGE - MAIN GEAR,T45,4F12.1)
      GO TO 380
  376 WRITE(6,870) FDAT(42),FDAT(43),FDAT(44),DWT(5)
  870 FORMAT(10X,16HWING - MAIN GEAR,T45,4F12.1)
  380 CONTINUE
      WRITE(6,872) FDAT(47),FDAT(48),FDAT(49),DWT(6)
  872 FORMAT(10X,20HFUSELAGE - NOSE GEAR,T45,4F12.1)
C
      WRITE(6,874) DWT(7)
  874 FORMAT(/5X,22HSURFACE CONTROLS GROUP,T93,F12.1)
C
      WRITE(6,876) DWT(8)
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CARD NO **** CONTENTS ****

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      676 FORMAT(/6X,14HENGINE SECTION,T93,F12.1)
          IF(DATS(1)) 382,382,386
      382 WRITE(6,678) FDAT(53),FDAT(55)
      678 FORMAT(10X,7HINBOARD,/10X,6HCENTER,T81,F12.1,/10X,8HOUTBOARD,
         1 /10X,24HDOORS, PANELS, AND MISC.,T81,F12.1)
          GO TO 388
      386 WRITE(6,679) FDAT(53),FDAT(54),FDAT(55)
      679 FORMAT(10X,7HINBOARD,T81,F12.1,/10X,6HCENTER,/10X,8HOUTBOARD,
         1 T81,F12.1,/10X,24HDOORS, PANELS, AND MISC.,T81,F12.1)
      388 CONTINUE
C
          WRITE(6,680) [illegible](9)
      680 FORMAT(/6X,27H[illegible]RUCTURE - OTHER A[illegible] MISC.,T93,F12.1)
          DO 390 I=1,9
          S(25) = S(25) + DWT(I)
      390 CONTINUE
          WRITE(6,682) S(25)
      682 FORMAT(/6X,20HTOTAL (TO BE BROUGHT FOR[illegible]),T93,F12.1)
C
C
          WRITE(6,601)
          WRITE(6,650)
          DO 392 I=10,19
          S(26) = S(26) + DWT(I)
      392 CONTINUE
          S(27) = DWT(12) + DWT(13)
C
          WRITE(6,683) S(26),DWT(10),DWT(11),S(27),(DWT(I+11),I=1,8)
      683 FORMAT(//6X,16HPROPULSION GROUP, T93,F12.1,/10X,
         1 19HENGINE INSTALLATION,T81,F12.1,/10X,
         2 31HACCESSORY GEAR BOXES AND DRIVES,T81,F12.1,/10X,
         3 20HAIR INDUCTION SYSTEM,T81,F12.1,/12X,9HSTRUCTURE,T69,F12.1,
         4 /12X,23HACTUATION AND CONTROLS,T69,F12.1,/10X,
         5 14HEXHAUST SYSTEM,T81,F12.1,/10X,
         6 35HCOOLING SYSTEM AND DRAIN PROVISIONS,T81,F12.1,/10X,
         7 18HLUBRICATING SYSTEM,T81,F12.1,/10X,11HFUEL SYSTEM,T81,F12.1,
         8 /10X,15HENGINE CONTROLS,T81,F12.1,/10X,15HSTARTING SYSTEM,
         9 T81,F12.1)
          WRITE(6,684) (DWT(I),I=20,30)
      684 FORMAT(/6X,27HAUXILIARY POWER PLANT GROUP,T93,F12.1,//6X,
         1 17HINSTRUMENTS GROUP,T93,F12.1,//6X,
         2 31HHYDRAULICS AND PNEUMATICS GROUP,T93,F12.1,//6X,
         3 16HELECTRICAL GROUP,T93,F12.1,//6X,17HELECTRONICS GROUP,T93,
         4 F12.1,//6X,14HARMAMENT GROUP,T93,F12.1,//6X,
         5 31HFURNISHINGS AND EQUIPMENT GROUP,T93,F12.1,//6X,
         6 47HAIR CONDITIONING AND ANTI-ICING EQUIPMENT GROUP,T93,F12.1,
         7 //6X,18HPHOTOGRAPHIC GROUP,T93,F12.1,//6X,
         8 20HAUXILIARY GEAR GROUP,T93,F12.1,//6X,
         9 25HOTHER EQUIPMENT AND MISC.,T93,F12.1)
          WRITE(6,686) S(25),S(1)
      686 FORMAT(/6X,24HTOTAL FROM PREVIOUS PAGE,T93,F12.1//6X,
         1 12HWEIGHT EMPTY,T93,F12.1)
          WRITE(6,801)
          GO TO 172
      400 CONTINUE
C
C         SETUP AND WRITE DIMENSIONAL DATA
          S(51) = (DVV(20) - X(1))/D(12)
          IF(DVV(20) - X(10)) 402,404,404
      402 S(51) = (X(10) - X(1))/D(12)
      404 S(52) = (DVV(27) - EDD(20))/D(12)
          S(53) = (X(10) - X(1))/D(12)
          S(54) = TOT(19)/D(12)
          S(55) = TOT(20)/D(12)
          S(56) = TOT(1)/D(17)
          S(57) = TOT(2)/D(12)/D(17)
C
          IF(DATS(1)) 410,410,408
      408 J = DATN(2)
          S(58) = (DATN(J+10) - DATN(1))/D(12)
          S(59) = DATN(4)
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      S(60) = DATN(5)
      DO 400 I=2,J
      S(59) = AMAX1(S(59),DATN(I+48))
      S(60) = AMAX1(S(  ),DATN(I+50))
      S(61) = S(61) + SFN(I-1)/D(17)
  400 CONTINUE
C
      S(59) = S(59)/D(12)
      S(60) = S(60)/D(12)
  410 S(62) = DVAT(1)/GDH(1)
      S(63) = DVH(43)/D(8)
      S(64) = GDH(2)*DVH(40)
      S(65) = GDH(2)*GDH(3)*DVH(40)
      S(66) = DVAT(2)/DVH(8)
      S(67) = GDH(2)*DVH(5)
      S(68) = DVH(5)*DVH(6)
      S(69) = GDH(2)*GDH(3)*S(68)
      S(70) = GDV(1)*DVV(23)
      S(71) = DVAT(3)/S(70)
      S(72) = DVV(30)*GDV(3)
      S(73) = GDV(2)*GDV(3)*S(72)
      S(74) = (DVH(28) - DVH(42))/D(12)
      S(75) = AMAX1(GDD(11),GDD(12))
      S(76) = D(10)*D(10)
      S(77) = GDD(10)
      S(78) = TOT(10)*D(30)*D(31)
      S(79) = GDV(2) * DVV(30)
C
C
      WRITE(6,801)
      WRITE(6,800)
  800 FORMAT(/30X,31HDIMENSIONAL AND STRUCTURAL DATA)
      WRITE(6,802) S(51),S(52)
  802 FORMAT(//6X,22HLENGTH - OVERALL (FT.),F7.2,20X,
     1 30HHEIGHT - OVERALL - STATIC (FT.),F7.2//65X,8HNACELLES,/61X,
     2 8HFUSELAGE,5X,7HINBOARD,5X,6HCENTER,5X,8HOUTBOARD)
      IF(DATS(1)) 420,420,430
  420 WRITE(6,804) S(53)
  804 FORMAT(6X,19HLENGTH - MAX. (FT.),T57,F12.2)
      WRITE(6,805) S(54)
  805 FORMAT(6X,19HDEPTH  - MAX. (FT.),T57,F12.2)
      WRITE(6,806) S(55)
  806 FORMAT(6X,19HWIDTH  - MAX. (FT.),T57,F12.2)
      WRITE(6,807) S(56)
  807 FORMAT(6X,21HWETTED AREA (SQ. FT.),T57,F12.2)
      GO TO 440
  430 IF(DATS(1) - D(3)) 432,432,435
C
C        TWO NACELLES
  432 WRITE(6,698) S(53),S(58)
  698 FORMAT(6X,19HLENGTH - MAX. (FT.),T57,2F12.2)
      WRITE(6,699) S(54),S(59)
  699 FORMAT(6X,19HDEPTH  - MAX. (FT.),T57,2F12.2)
      WRITE(6,700) S(55),S(60)
  700 FORMAT(6X,19HWIDTH  - MAX. (FT.),T57,2F12.2)
      WRITE(6,701) S(56),S(61)
  701 FORMAT(6X,21HWETTED AREA (SQ. FT.),T57,2F12.2)
      GO TO 440
  435 WRITE(6,702) S(53),S(58),S(58)
  702 FORMAT(6X,19HLENGTH - MAX. (FT.),T57,2F12.2,12X,F12.2)
      WRITE(6,703) S(54),S(59),S(59)
  703 FORMAT(6X,19HDEPTH  - MAX. (FT.),T57,2F12.2,12X,F12.2)
      WRITE(6,704) S(55),S(60),S(60)
  704 FORMAT(6X,19HWIDTH  - MAX. (FT.),T57,2F12.2,12X,F12.2)
      WRITE(6,705) S(56),S(61),S(61)
  705 FORMAT(6X,21HWETTED AREA (SQ. FT.),T57,2F12.2,12X,F12.2)
  440 WRITE(6,708) S(57)
  708 FORMAT(6X,25HFUSELAGE VOLUME (CU. FT.),T57,F12.2)
C
      WRITE(6,710) GDH(1),DVH(8),S(70)
  710 FORMAT(/75X,4HWING,7X,7HH. TAIL,4X,7HV. TAIL,/6X,
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CARD NO **** CONTENTS ****

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      1 29HGROSS AREA (SQ. FT.),T69,3F12.2)
        WRITE(6,712) $(62),$(68),$(71)
  712 FORMAT(6X,32HWEIGHT/GROSS AREA (LBS./SQ. FT.),T69,3F12.2)
        WRITE(6,714) $(63),DVH(9),DVV(29)
  714 FORMAT(6X,10HSPAN (FT.),T69,3F12.2)
        WRITE(6,716) DVH(50),DVH(23),DVV(22)
  716 FORMAT(6X,29HSWEEPBACK - AT .25C (DEGREES),T69,3F12.2)
        WRITE(6,718) DVH(48),DVH(5),DVV(30)
  718 FORMAT(6X,40HTHEORETICAL ROOT CHORD - LENGTH (INCHES),T69,3F12.2)
        WRITE(6,720) $(64),$(67),$(79)
  720 FORMAT(29X,25H- MAX. THICKESS (INCHES),T69,3F12.2)
        WRITE(6,722) DVH(49),$(6C),$(72)
  722 FORMAT(6X,40HTHEORETICAL TIP CHORD - LENGTH (INCHES),T69,3F12.2)
        WRITE(6,720) $(65),$(69),$(73)
        WRITE(6,724) $(74)
  724 FORMAT(6X,31HTAIL LENGTH - .25 MAC WING TO .25 MAC H. TAIL (FT.),
     1 T81,F12.2)
        WRITE(6,726) GOD(24),GOD(23),GOD(22),GOD(21)
  726 FORMAT(/6X,14HALIGHTING GEAR,95X,4HNOSE,8X,4HMAIN,/9X,
     1 30HLENGTH - OLEO EXTENDED - AXLE TO TRUNNION (INCHES),T69,2F12.2,
     2 /9X,31HOLEO TRAVEL - FULL EXTENDED TO FULL COLLAPSED (INCHES),
     3 T69,2F12.2)
        WRITE(6,728)  $(32),$(75)
  728 FORMAT(/6X,23HSTRUCTURAL DATA - CONDITION,52X,6HSTRESS,4X,
     1 18HLIMIT LOAD,/62X,12HGROSS WEIGHT,4X,6HFACTOR,/9X,
     2 6HFLIGHT,T81,2F12.2)
        WRITE(6,730)  $(33),$(31),$(20),$(78),$(77),$(78)
  730 FORMAT(9X,7HLANDING,T81,F12.2,/9X,
     1  8HTAKE-OFF,T81,F12.2,/9X,33HLIMIT AIRPLANE LANDING SINK SPEED,
     2 11H (FT./SEC.),T93,F12.2,/9X,
     3 60HWING LIFT ASSUMED FOR LANDING DESIGN CONDITION (PERCENT WT.),
     4 T93,F12.2,/9X,37HSTALL SPEED - LANDING CONFIGURATION -,
     5 18H POWER OFF (KNOTS),T93,F12.2,/9X,19HPRESSURIZED CABIN -,
     6 31H ULT. DESIGN PRESSURE DIFFERENTIAL - FLIGHT (P.S.I),
     7 T93,F12.2)
        END
```